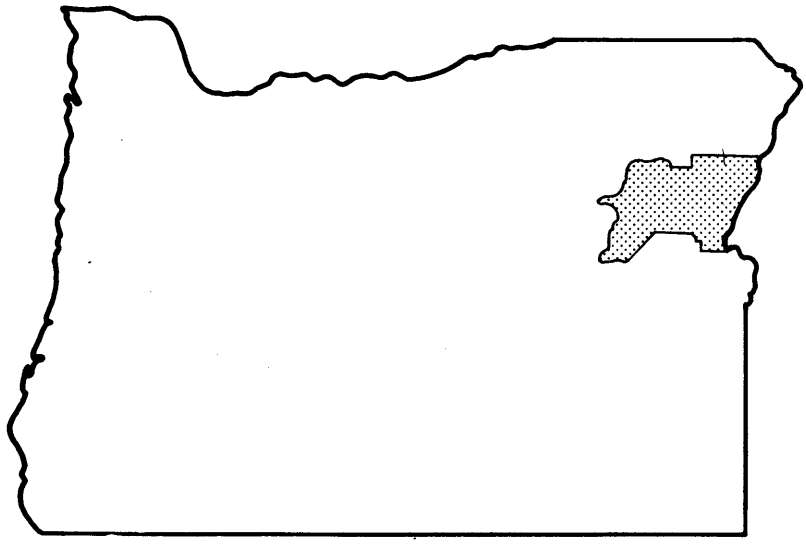
FLOOD INSURANCE STUDY

BAKER COUNTY, OREGON
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BAKER, CITY OF	410002
HALFWAY, TOWN OF	410004
HUNTINGTON, CITY OF	410005
SUMPTER, CITY OF	410007
UNINCORPORATED AREAS	410001



JUNE 3, 1988

Federal Emergency Management Agency

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
BAKER COUNTY, OREGON AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the geographic area of Baker County, Oregon, including the incorporated Cities of Baker, Haines, Huntington, Sumpter, the incorporated Town of Halfway, and the unincorporated areas of Baker County (hereinafter referred to collectively as Baker County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

This Flood Insurance Study revises and updates a previous Flood Insurance Study/Flood Insurance Rate Map for the City of Baker, Baker County, Oregon (Reference 1). This information will be used by the City of Baker to update existing floodplain regulations as part of the Regular Phase of the NFIP. The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence; and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by CH2M HILL NORTHWEST, Inc. (the study contractor), for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-84-C-1659. This study was completed in May 1986.

The hydrologic and hydraulic analyses for Powder River and Old Settler's Slough within the City of Baker were performed by the U.S. Army Corps of Engineers (COE), Walla Walla District, for FEMA under Interagency Agreement No. IAA-H-9-79, Project Order No. 17, which was completed in September 1982.

The hydrologic and hydraulic analyses for North Powder River were performed by Stevens, Thompson, and Runyan, Inc., for the Federal Insurance Administration, under Contract No. H-3995, which was completed in January 1977.

1.3 Coordination

Streams requiring detailed study were identified at a meeting attended by representatives of Baker County, FEMA, and the study contractor in April 1984.

Results of the hydrologic analyses were coordinated with the COE in Walla Walla, Washington; the U.S. Geological Survey (USGS) in Portland, Oregon; and FEMA.

On April 8, 1987, the results of the study were reviewed at the final meeting attended by representatives of the study contractor, FEMA, and community officials. The study was acceptable to the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the geographical area of Baker County, Oregon. The area of study is shown on the Vicinity Map (Figure 1).

The limits of the detailed studies in Baker County were determined by FEMA with community and study contractor consultation at the meeting in April 1984.

The following areas were studied by detailed methods and were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through March 1991:

- Powder River from the City of Baker's urban growth boundary to its northern corporate limit (1.0 mile).
- Powder River within the City of Baker (3.3 miles).
- Powder River from the City of Baker's southern corporate limit to Griffin Gulch (1.0 mile).

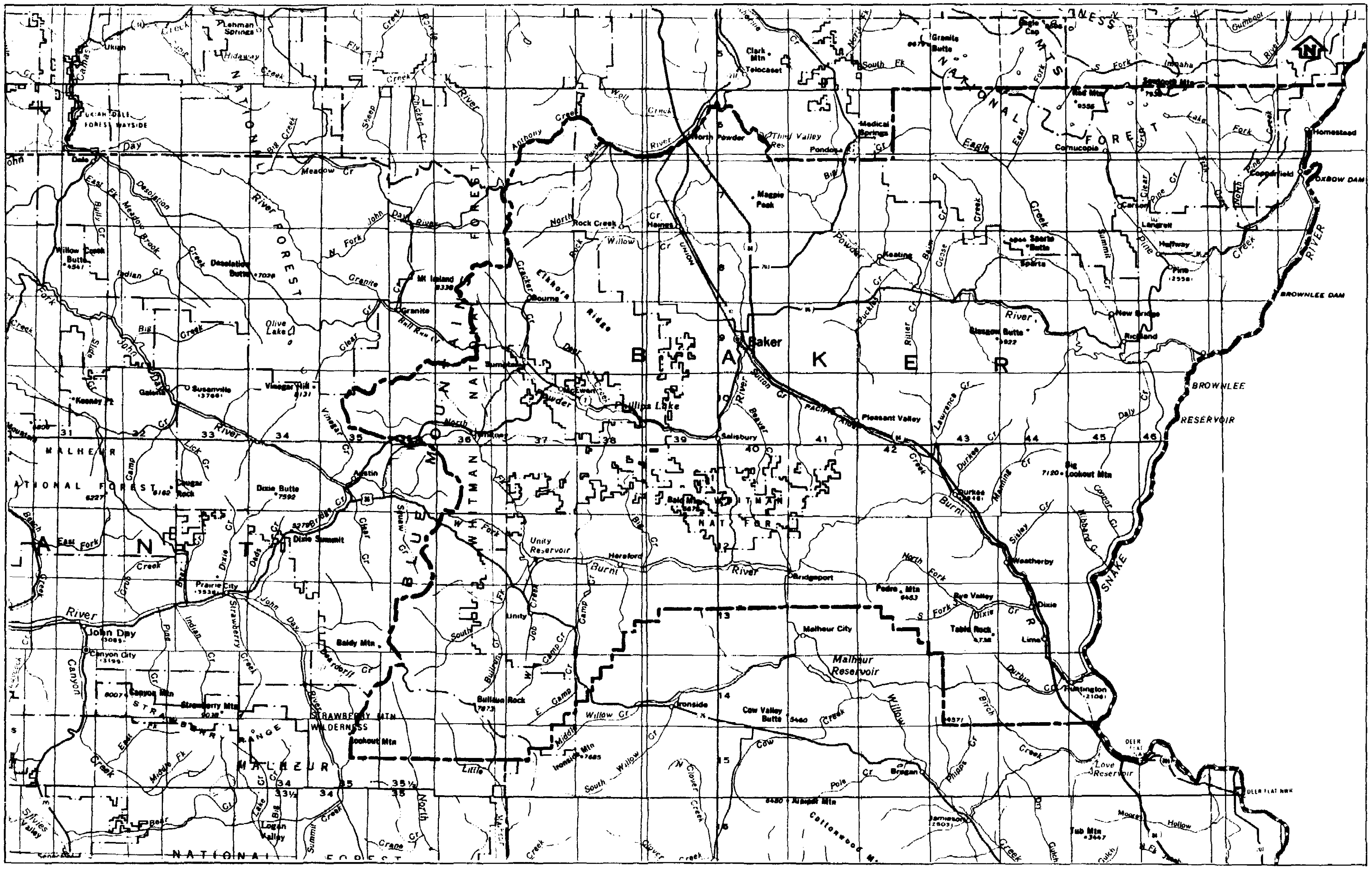

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
(AND INCORPORATED AREAS)

APPROXIMATE SCALE

12.5 0 12.5 25 37.5

VICINITY MAP

- Powder River from the Whitney-Tippen Highway No. 7 Bridge to the confluence of McCulley Fork and Cracker Creek near Sumpter (1.7 miles).

- North Powder River at the City of North Powder (1.7 miles).

- Old Settler's Slough from the City of Baker's urban growth boundary to its western corporate limit (1.0 mile).

- Pine Creek near Halfway from Pine Creek Highway to East Pine Creek Road (1.0 mile).

Approximate analyses were used to study the following areas having a low development potential or minimal flood hazards: portions of Rock Creek, Pine Creek near Baker, Mill Creek, Stices Gulch, Eagle Creek, Summit Creek, and Pine Creek at Copperfield.

The scope and methods of study were proposed to and agreed upon by FEMA and the County of Baker.

2.2 Community Description

Baker County is located in the northeastern portion of Oregon. It is bordered on the north by Union and Wallowa Counties, on the west by Grant County, on the south by Malheur County, and on the east by Snake River and Idaho. The county has an area of 3,089 square miles, with a third of it being in Whitman National Forest. The U.S. Census Bureau reports that the population increased from 14,900 in 1970 to 16,100 in 1980, of which 4,700 live in the unincorporated areas of the county (Reference 2).

U.S. Census Bureau population figures for the incorporated areas follow (References 2 and 3):

Community	1970 Population	1980 Population	1984 Population
City of Baker	9354	9471	9510
City of Haines	212	341	395
City of Huntington	507	539	550
City of Sumpter	120	133	140
Town of Halfway	317	380	400

Burnt and Powder Rivers originate in the Blue Mountains on the western border of the county. The Burnt River flows east through the southern portion of the county to its confluence with Snake River. It has a drainage area of 328 square miles and a length of 1,100 miles. The Powder River flows in an easterly direction through the northern portion of the county to its confluence with Snake River. It has a length of 296 miles and a total drainage area of 1,660 square miles. Pine Creek near Wingville, Rock Creek,

Mill Creek, Stices Gulch, and Eagle Creek are tributaries of Powder River. Pine Creek at Copperfield flows northeast directly into Snake River.

Development within the floodplains studied is mostly agricultural, with limited residential and commercial development. The county's economic activities are associated with its climatologic and geographic influences; its principal industries are based on agriculture, livestock, and timber.

Baker County has a semiarid climate characterized by warm summers and cold winters. Average temperatures range from 25 degrees Fahrenheit in January to 68 degrees Fahrenheit in July. Annual average precipitation of the region is 14 inches, ranging from an average high of 60 inches in the mountain regions to an average low of 8 inches in the valleys. Snowfall averages 26 inches in the valleys, but can reach over 290 inches in the Wallowa Mountains.

Over one-half of the total precipitation occurs during the winter months, with the minimum occurring during July and August. Summer thunderstorms occasionally produce high intensity precipitation (Reference 4).

The topography of Baker County consists of rolling foothills and mountainous regions with flat plains along the major rivers. The geologic makeup of Baker County is primarily basalt and andesite flows with volcanic tuff and ash deposits on older volcanic rocks. Much of this volcanic material is highly permeable and tends to dampen snowmelt runoff, with many areas becoming the source of predominant springs (Reference 5). Most of the floodplain areas are located on alluvium deposits (Reference 6). The vegetation in Baker County varies with the climate. Coniferous trees, mostly pine, grow in the mountainous regions. Hills and flat regions are predominantly cultivated farms with deciduous trees and small bushes along the floodplains.

2.3 Principal Flood Problems

Flooding on the streams within Baker County usually occurs in the late winter months as a result of rain combined with fast snowmelt caused by extreme temperature changes at higher elevations. Minor flooding can occur from ice jams, spring snowmelt, or summer thunderstorms.

Portions of the streams studied in Baker County are perched on alluvium deposits and have natural, normally dry drainage channels that lead away from the stream. During periods of heavy flooding, the natural channels can become flow paths and produce minor flooding of one foot or less, in the event culverts or bridges become blocked by ice or uprooted vegetation.

No systematic flood records have been kept for Baker County, and no high water marks have been recorded other than from streamflow gages. Major floods occurred at the mouth of the Powder River in May 1948 and 1956, February 1957 and 1963, December 1964, and January 1965. Damages resulting from the flood of 1964 with a peak discharge of 1,120 cubic feet per second (cfs) were approximately $320,000. Damages from the flood of 1965 with a peak discharge of 3,470 cfs were approximately $724,400. The maximum recorded flow at the mouth of the Powder River was 5,500 cfs in May 1956, and damages were not recorded (Reference 7). A peak discharge of 1,820 cfs was recorded on the Powder River south of Baker in March 1910. This flood had an estimated recurrence interval of 111 years (References 5 and 8).

2.4 Flood Protection Measures

Mason Dam contains Phillips Lake on the Powder River, 19 miles upstream from the City of Baker. It was constructed in 1968 by the U.S. Bureau of Reclamation for irrigation and flood control and has a 17,000 acre-feet capacity reserved exclusively for flood control and has 21,000 acre-feet available for joint use.

Two other dams have been constructed by the U.S. Bureau of Reclamation in Baker County: Thief Valley Reservoir Dam on the Powder River and Unit Reservoir Dam on the Burnt River. These dams are primarily operated for irrigation and power, but they also reduce floodflow peaks due to reservoir routing and storage (Reference 7).

The National Weather Service in Portland, Oregon, provides flood warnings to areas in and around the City of Baker. Flood warnings are made for numerous smaller streams in Baker County by city, county, and state authorities (Reference 7).

Nonstructural measures of flood protection are also being used to aid in the prevention of future flood damage. These are in the form of land use regulations, adopted from the Code of Federal Regulations, which control building within areas that have a high risk of flooding (Reference 9).

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the county.

With the exception of the Powder River and Old Settler's Slough near Baker, flood discharges for areas of detailed and approximate study were based on USGS Water Resources Investigations Report 82-4078, Magnitude and Frequency of Flood in Eastern Oregon (Reference 5). The USGS report presents the 2-, 5-, 10-, 25-, 50-, and 100-year discharges based on statistical analyses of discharge records for 162 gaging stations operated by the USGS (Reference 5).

The analyses followed the standard log-Pearson Type III method, as outlined by the U.S. Water Resources Council (Reference 10). Peak discharges of gaged sites were transferred to various points along the study area using the transfer equations and specified limitations from the USGS report.

For ungaged streams, flood discharges were determined using the regional flood-frequency equations included in the USGS report (Reference 5). These regression equations relate drainage area, channel length, temperature index, mean annual precipitation, and forest cover to peak discharges.

The 500-year discharges were determined by extrapolation of the frequency-discharge curves for the detailed study areas. Flows determined by the regional flood-frequency equations and by extrapolation were compared to a log-log plot of the USGS discharge data at gaged sites for reasonableness (Reference 5).

Floodflows for Old Settler's Slough and Power River at Baker were determined by the COE for the City of Baker's Flood Insurance Study (Reference 1). The Powder River flows used in that study reflect regulation by Phillips Lake. These regulated flows were transferred to the study area using equations from the USGS report (Reference 5).

Peak discharge-drainage area relationships for the detailed study areas in Baker County are shown in Table 1. Peak discharge-drainage area relationships for the approximate study areas are shown in Table 2.

TABLE 1. SUMMARY OF DISCHARGES FOR DETAILED STUDIES

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Powder River at Baker					
1.1 Miles Downstream from Baker North Corporate Limits	356.8	1,100	1,490	1,660	2,650
North Corporate Limits	354.0	1,100	1,490	1,660	2,650
South Corporate Limits	288.4	940	1,280	1,420	2,270
Powder River at Sumpter					
At Whitney-Tippen Highway No. 7	63.0	820	1,150	1,280	1,630
Upstream of McCulley Fork	54.5	730	1,030	1,150	1,470
North Powder River at City of North Powder	80.0	680	940	1,350	1,440
Old Settler's Slough					
1.4 Miles Downstream From Baker West Corporate Limits	5.52	30	53	65	137
At Baker West Corporate Limits	2.56	30	53	65	137
Pine Creek (at Halfway)					
At Pine Creek Highway	53.9	1,160	1,580	1,740	2,150
At East Pine Creek Road	49.1	1,100	1,490	1,640	2,030

TABLE 2. SUMMARY OF DISCHARGES FOR APPROXIMATE STUDIES

Flooding Source and Location	Drainage Area (square miles)	100-Year Peak Discharges (cfs)
Pine Creek (At Copperfield)		
At Confluence with Snake River	300.0	4,560
At Confluence with Sheep Creek	291.8	4,470

TABLE 2. SUMMARY OF DISCHARGES FOR APPROXIMATE STUDIES (cont'd)

Flooding Source and Location	Drainage Area (square miles)	100-Year Peak Discharges (cfs)
Eagle Creek (at New Bridge)		
Beginning of Study, River Mile 3.0	191.8	6,050
Upstream of Summit Creek	179.2	5,170
Upstream Study Limit, River Mile 5.0	172.7	5,590
Rock Creek		
At Rock Creek Road	23.9	440
Upstream Study Limit	22.0	410
Summit Creek (near New Bridge)		
At Confluence with Eagle Creek	11.2	350
At Upstream Study Limit	10.6	320
Pine Creek (near Baker)		
Beginning of Study	9.7	330
Upstream Study Limit	8.6	300
Mill Creek		
Beginning of Study	8.9	300
Upstream of Marble Creek	4.6	180
At Confluence with Little Mill Creek	3.6	160
Stices Gulch		
Beginning of Study	6.7	180
Upstream Study Limit	4.0	120

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses of Powder River, Old Settler's Slough, and Pine Creek were obtained from aerial photographs flown in November 1984 at a negative scale of 1:14,400 (Reference 11). Cross sections used for North Powder River were selected from aerial photographs (References 12 and 13) and (Reference 11). Cross sections used for North Powder River were selected from aerial photographs (References 12 and 13) and corresponding cross section data from photogrammetric methods. The

below-water sections were obtained by field measurement. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations of the streams and floodplain areas. Roughness coefficients (Manning's "n") for North Powder River were estimated by field inspection at cross sections and by comparison of these conditions with conditions in other areas with known roughness characteristics. There were no good records of high-water marks, and there have been no heavy floods in the area since the construction of Interstate Highway 80N, which is just upstream of the City of North Powder. The roughness values used to study the streams of Baker County are shown in Table 3.

TABLE 3. RANGE OF MANNING'S ROUGHNESS VALUES

Stream	Channel Value	Floodplain Value
Powder River at Baker		
North of Baker	0.035	0.045 to 0.065
Within Baker	0.035	0.040 to 0.045
South of Baker	0.035	0.045 to 0.050
At Sumpter	0.035	0.045 to 0.050
North Powder River		
At North Powder	0.030 to 0.035	
Old Settler's Slough	0.035	0.035
Pine Creek at Halfway	0.035	0.050 to 0.065
Pine Creek at Copperfield	0.033 to 0.038	0.065 to 0.075
Eagle Creek	0.035	0.055
Rock Creek	0.035	0.045 to 0.065
Summit Creek	0.035	0.060
Pine Creek near Baker	0.035	0.065
Mill Creek	0.035	0.070
Stices Gulch	0.035	0.065

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the COE HEC-2 step-backwater computer program (Reference 14). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for Powder River, Old Settler's Slough, and Pine Creek were calculated using the slope-area method.

The starting water-surface elevation on the North Powder River was determined by first assuming a starting elevation for a cross section located 2,000 feet downstream of the first cross section to be used in the study. Calculations at this and one more cross section help to stabilize the depth of water at the first study cross section. A sensitivity test was made at this point to see if a variance of the beginning water-surface elevation would greatly affect the depth 2,000 feet upstream. Tests showed little variation; therefore, it was concluded that the beginning water-surface elevation was valid (Reference 13).

The approximate methods utilize normal-depth calculations to determine the water depth (from stream invert to water surface) at selected cross sections for the 100-year flood.

Cross sections used in the approximate studies were obtained by field measurements and based on local datum.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum (NGVD) of 1929. Elevation reference marks used in this study are shown on the maps; the description of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA

as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800, with a contour interval of 4 feet (Reference 15).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, and AO); and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, the 100-year floodplain boundary was developed from normal depth calculations and topographic maps enlarged to a scale of 1:12,000, with contour intervals of 40 and 80 feet (References 16 and 17). The resulting floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2).

Approximate 100-year floodplain boundaries in some portions of the study area were taken directly from the Flood Hazard Boundary Map (Reference 18) and Flood Insurance Rate Maps (References 19, 20, and 21) for incorporated cities within Baker County.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Powder River at Baker								
A-R[2]	---	---	---	---	---	---	---	---
S	21,045	53	271	6.1	3458.4	3458.4	3458.4	0.0
T	21,825	61	291	5.7	3460.3	3460.3	3460.3	0.0
U	22,295	200	622	2.7	3461.1	3461.1	3461.1	0.0
V	22,915	108	380	4.4	3461.3	3461.3	3461.5	0.2
W	23,515	197	292	5.7	3462.7	3462.7	3462.8	0.1
X	24,165	70	248	6.7	3465.3	3465.3	3465.3	0.0
Y	24,995	138	262	6.3	3468.9	3468.9	3469.1	0.2
Z	25,495	103	384	4.3	3470.7	3470.7	3470.9	0.2
AA	25,805	55	158	10.5	3473.2	3473.2	3473.2	0.0
AB	26,050	49	275	5.2	3475.9	3475.9	3476.9	1.0
AC	28,070	53	262	5.4	3480.8	3480.8	3480.8	0.0
AD	29,490	57	313	4.5	3483.1	3483.1	3483.3	0.2

[1]Stream Distance in Hundereds of Feet Above T 8/9S.
[2]A Floodway was not developed for reach between Cross Sections A through R, because the numerous overflows cannot be contained in the channel and meet the FEMA floodway standards.

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

POWDER RIVER (AT BAKER)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Powder River at Sumpter								
A	0	96	191	6.7	4241.9	4241.9	4242.2	0.3
B	40	96	191	6.7	4241.9	4241.9	4242.2	0.3
C	240	96	182	7.1	4243.3	4243.3	4243.3	0.0
D	1,340	116	221	5.8	4249.9	4249.9	4249.9	0.0
E	2,860	110	210	6.1	4261.5	4261.5	4261.5	0.0
F	4,060	62	177	7.3	4270.3	4270.3	4270.3	0.0
G	4,260	62	181	7.1	4271.3	4271.3	4271.3	0.0
H	4,300	62	182	7.1	4271.3	4271.3	4271.3	0.0
I	4,500	62	163	7.9	4272.3	4272.3	4272.3	0.0
J	6,920	61	170	7.5	4288.8	4288.8	4289.0	0.2
K	9,160	92	156	8.2	4310.1	4310.1	4310.2	0.1
L	10,640	100	205	6.3	4321.8	4321.8	4321.8	0.0
M	11,740	44	116	9.9	4332.1	4332.1	4332.1	0.0
N	13,000	100	294	3.9	4342.6	4342.6	4342.6	0.0
O	14,480	69	121	9.5	4353.5	4353.5	4353.5	0.0
P	14,680	69	170	6.8	4355.9	4355.9	4355.9	0.0
Q	14,720	69	174	6.6	4356.0	4356.0	4356.0	0.0
R	14,920	69	132	8.7	4357.1	4357.1	4357.1	0.0
S	16,340	85	187	6.1	4369.9	4369.9	4370.2	0.3
T	18,140	91	187	6.1	4383.5	4383.5	4383.6	0.1

[1]Stream Distance in Feet Above Downstream Side of Whitney Tippon Highway Bridge.

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

POWDER RIVER (AT SUMPTER)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
North Powder River								
A	4,170	24	305	4.40	3222.1	3222.1	3222.1	0.0
B	5,890	57	406	3.30	3228.4	3228.4	3228.6	0.2
C	8,670	16	392	3.40	3238.5	3238.5	3238.5	0.0
D	9,890	42	225	6.00	3244.4	3244.4	3244.0	0.4
E	9,920	10	309	4.40	3245.1	3245.1	3244.1	1.0
F	10,330	25	232	5.80	3247.5	3247.5	3247.5	0.0
G	12,300	34	192	7.00	3255.8	3255.8	3255.8	0.0
H	12,470	71	284	4.80	3256.9	3256.9	3257.9	1.0
I	13,350	28	211	6.40	3260.7	3260.7	3260.8	0.1

[1]Stream Distance In Feet Above Mouth

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

NORTH POWDER RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Old Settler's Slough								
A	0	19	36	1.8	3388.9	3388.9	3389.9	1.0
B	880	19	23	2.8	3391.2	3391.2	3391.2	0.0
C	910	19	23	2.8	3391.2	3391.2	3391.2	0.0
D	1,240	19	25	2.6	3391.9	3391.9	3391.9	0.0
E	3,420	20	33	2.0	3394.8	3394.8	3394.8	0.0
F	4,560	20	11	5.8	3397.9	3397.9	3397.9	0.0
G	4,980	29	23	2.9	3401.7	3401.7	3401.7	0.0
H	5,010	29	21	3.1	3401.7	3401.7	3401.7	0.0
I	5,610	29	27	2.4	3403.9	3403.9	3403.9	0.0
J	6,730	22	29	2.2	3406.4	3406.4	3406.4	0.0
K	8,130	17	17	3.7	3409.9	3409.9	3409.9	0.0
L	9,000	16	24	2.7	3412.9	3412.9	3412.9	0.0
M	10,870	19	16	4.2	3420.7	3420.7	3420.7	0.0
N	13,240	23	36	1.8	3427.7	3427.7	3427.7	0.0
O	14,240	23	33	2.0	3428.9	3428.9	3428.9	0.0
P	15,830	18	11	5.9	3437.4	3437.4	3437.4	0.0
Q	16,850	38	40	1.6	3440.4	3440.4	3441.3	0.9
R	17,535	44	25	2.6	3442.1	3442.1	3442.6	0.5
S	18,450	127	62	1.1	3444.8	3444.8	3444.8	0.0
T	19,150	125	36	1.8	3447.0	3447.0	3447.0	0.1
U	20,010	43	33	2.0	3450.3	3450.3	3450.5	0.2

[1] Stream Distance in Hundreds of Feet Above Range Line 39/40 E.

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

OLD SETTLER'S SLOUGH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Pine Creek at Halfway								
A	0	73	214	8.1	2622.1	2622.1	2622.2	0.1
B	40	73	284	6.1	2623.2	2623.2	2623.5	0.3
C	440	73	192	9.0	2626.0	2626.0	2626.1	0.1
D	920	73	209	8.3	2631.5	2631.5	2631.5	0.0
E	1,440	73	208	8.4	2636.2	2636.2	2636.3	0.1
F	1,480	73	276	6.3	2637.7	2637.7	2637.7	0.0
G	1,820	73	184	9.4	2640.8	2640.8	2640.8	0.0
H	3,160	67	173	10.0	2659.4	2659.4	2659.4	0.0
I	4,960	112	201	8.7	2684.3	2684.3	2684.3	0.0
J	6,520	59	170	10.2	2705.5	2705.5	2705.5	0.0
K	6,720	59	169	10.3	2708.2	2708.2	2708.2	0.0
L	6,760	59	150	11.6	2708.2	2708.2	2708.2	0.0

[1] Stream Distance in Feet Above Pine Creek Highway Bridge.

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

PINE CREEK (AT HALFWAY)

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated at selected cross sections (Table 4). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

Along Powder River, between Cross Sections A and R at Campbell Street, a floodway was not developed because the numerous overflows cannot be contained in the channel and meet the FEMA floodway standards.

Also along Powder River, between Campbell Street and the Union Pacific Railroad, the 100-year flood is contained within an improved channel. Between these two points, the 100-year floodplain has been designated as the floodway.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

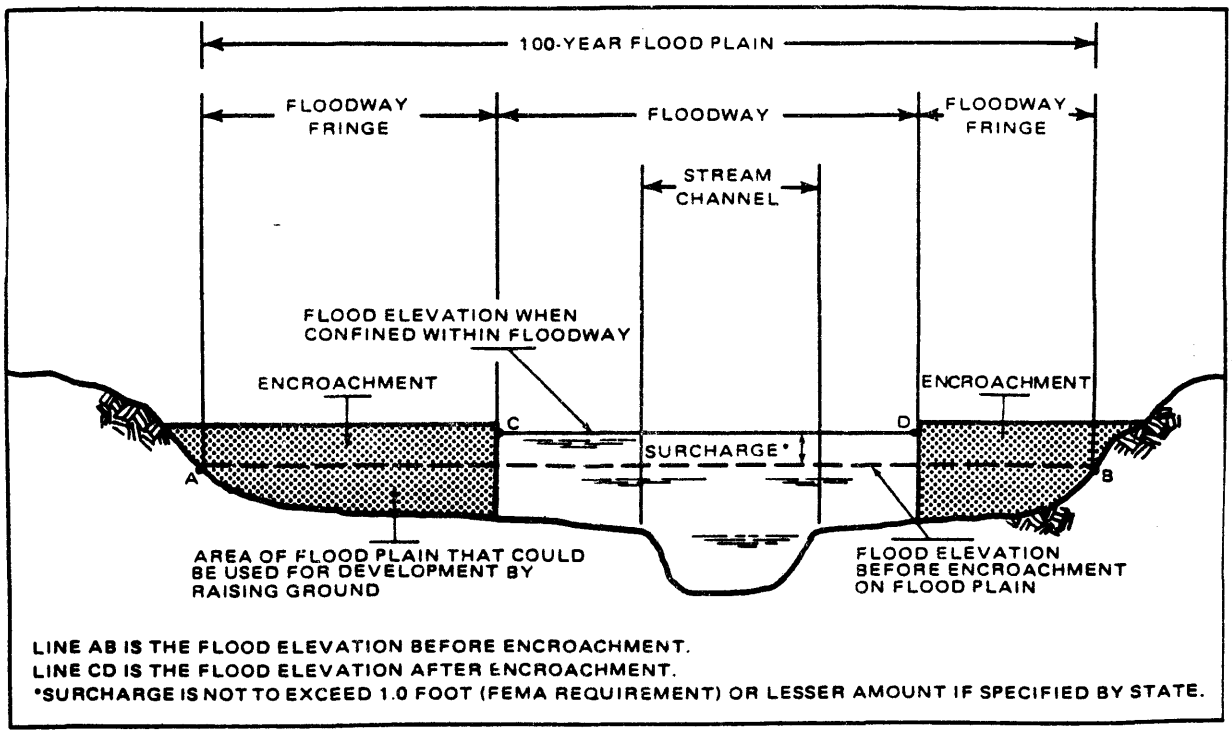

Figure 2. Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheetflow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies. For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The current Flood Insurance Rate Map presents flooding information for the entire geographic area of Baker County. Previously, separate Flood Hazard Boundary Maps and/or Flood Insurance Rate Maps were prepared for each identified flood-prone incorporated community and the unincorporated areas of the county. Historical data relating to the maps prepared for each community are presented in Table 5, Community Map History.

7.0 OTHER STUDIES

A Flood Insurance Study was prepared for the City of Baker by the COE (Reference 1). A discrepancy of floodplain boundaries and elevations between the City of Baker and Baker County studies has resulted in a restudy of the City of Baker's Flood Insurance Study. The results of the City of Baker's restudy have been incorporated into this study.

This study is in agreement with the effective Flood Insurance Studies for the City of North Powder and Union County (References 13 and 22).

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Maps for Baker County (Reference 18), and the Flood Insurance Study for the City of Baker (Reference 1).

This study also incorporates and effectively supersedes the existing Flood Insurance Rate Maps for the incorporated Cities of Huntington and Sumpter and the Town of Halfway (References 19, 20, and 21).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Chief, Natural and Technological Hazards Division, FEMA, Federal Regional Center, 130 228th Street, S.W., Bothell, Washington 98021-9796.

COMMUNITY NAME	INITIAL IDENTIFICATION	FHBM REVISION DATE(S)	FIRM EFFECTIVE DATE	EFFECTIVE DATE OF COUNTYWIDE FIRM	EFFECTIVE DATE (S) OF MAP/PANEL REVISIONS
Baker, City of	February 1, 1974	April 23, 1976	April 17, 1984	June 3, 1988	
Haines, City of	December 6, 1974	Rescinded and Regular Phase Conversion Effective April 30, 1984		June 3, 1988	
Halfway, Town of	September 26, 1975	November 22, 1977	September 24, 1984	June 3, 1988	
Huntington, City of	November 30, 1973	December 5, 1975	September 24, 1984	June 3, 1988	
Sumpter, City of	December 24, 1976	August 2, 1977	September 24, 1984	June 3, 1988	
Unincorporated Areas	February 28, 1978	----------	----------	June 3, 1988	

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

9.0 BIBLIOGRAPHY AND REFERENCES

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5. U.S. Department of the Interior, Geological Survey, Magnitude and Frequency of Floods in Eastern Oregon, Open File Report 82-4078, Portland, Oregon.

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17. U.S. Department of the Interior, Geological Survey, 15-Minute Series Topographic Maps, Scale 1:62,500, Contour Interval 80 feet: Copperfield, Oregon (1957); Halfway, Oregon (1957).

18. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Maps, Baker County, Oregon, Scale 1:24,000, February 1978.

19. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Rate Map, City of Huntington, Baker County, Oregon, September 1984.

20. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Rate Map, City of Sumpter, Baker County, Oregon, September 1984.

21. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Rate Map, Town of Halfway, Baker County, Oregon, September 1984.

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50 - AND 100 YEAR FLOODS COINCIDE

LIMIT OF DETAILED STUDY

ELEVATION (FEET NGVD)

3405
3400
3395
3390
3385

31 33 35 37 39 41 43 45 47 49 51 53 55

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE T 8/9 S

A B C

LEGEND

- 500 - YEAR FLOOD
- 100 - YEAR FLOOD
- 50 - YEAR FLOOD
- 10 - YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

POWDER RIVER (AT BAKER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR AND INCORPORATED AREAS

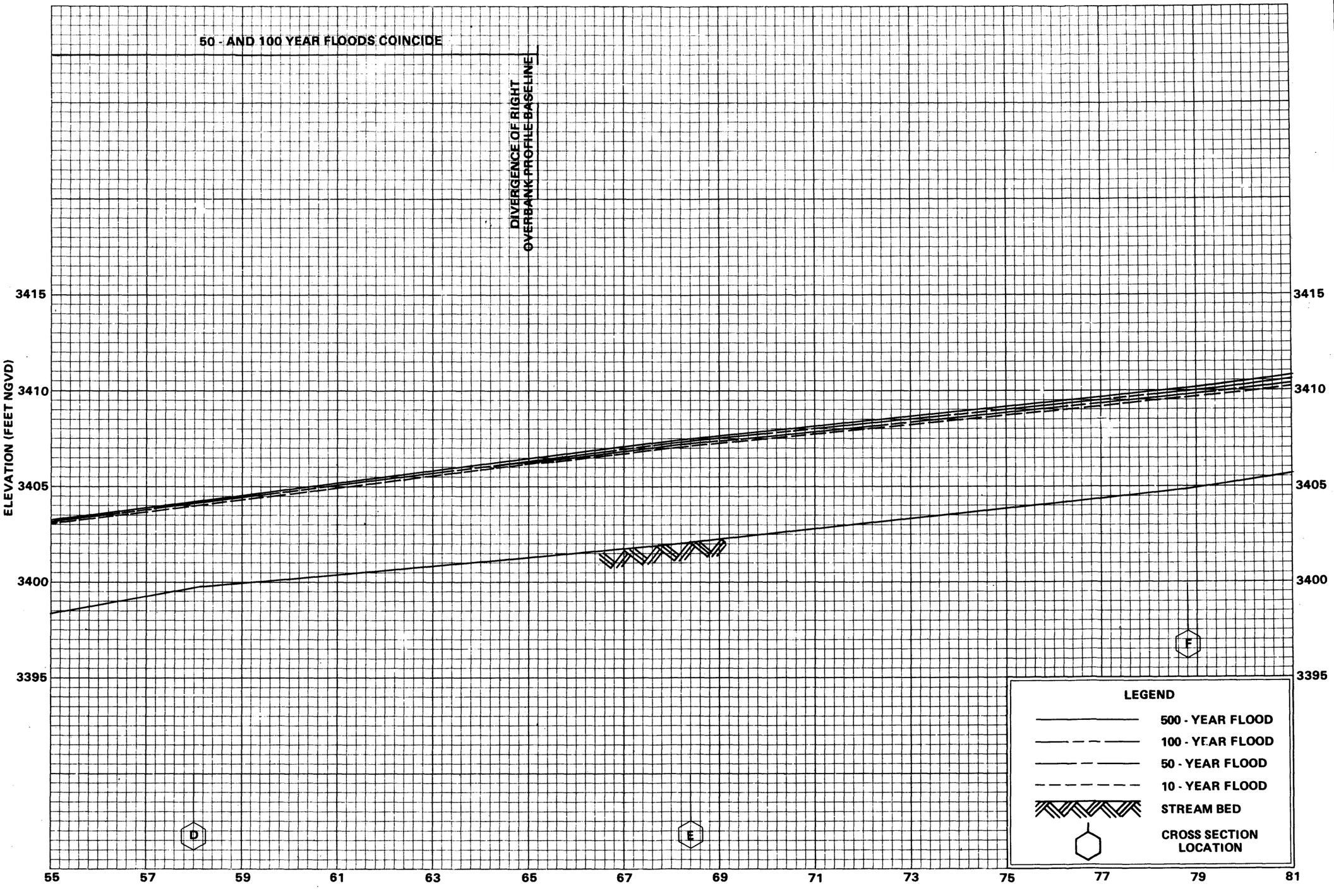
01P

50 - AND 100 YEAR FLOODS COINCIDE

DIVERGENCE OF RIGHT OVERBANK PROFILE BASELINE

ELEVATION (FEET NGVD)

3415
3410
3405
3400
3395



LEGEND

- 500 - YEAR FLOOD
- 100 - YEAR FLOOD
- 50 - YEAR FLOOD
- 10 - YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

55 57 59 61 63 65 67 69 71 73 75 77 79 81

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE T 8/9 S

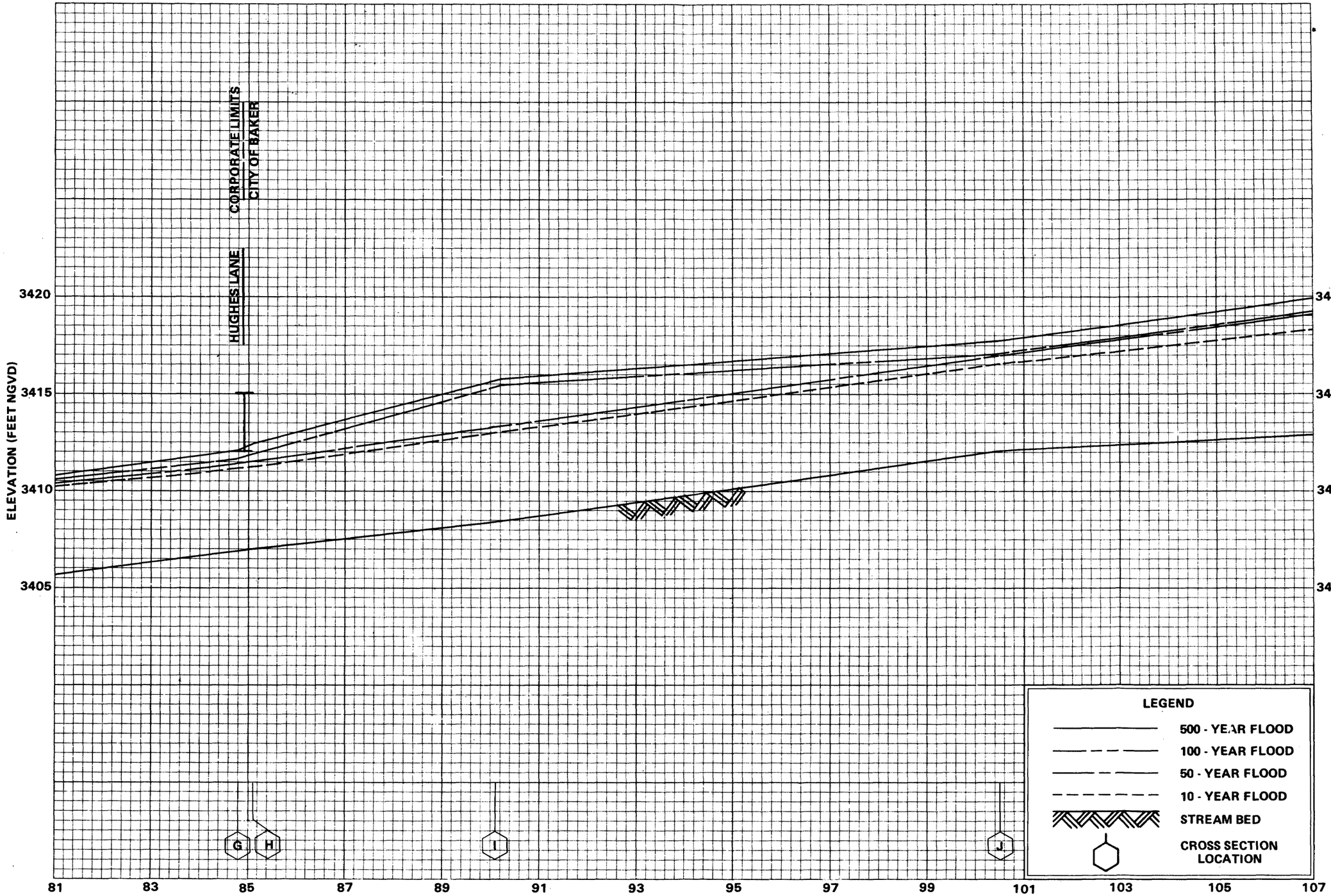
FLOOD PROFILES

POWDER RIVER (AT BAKER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

02P



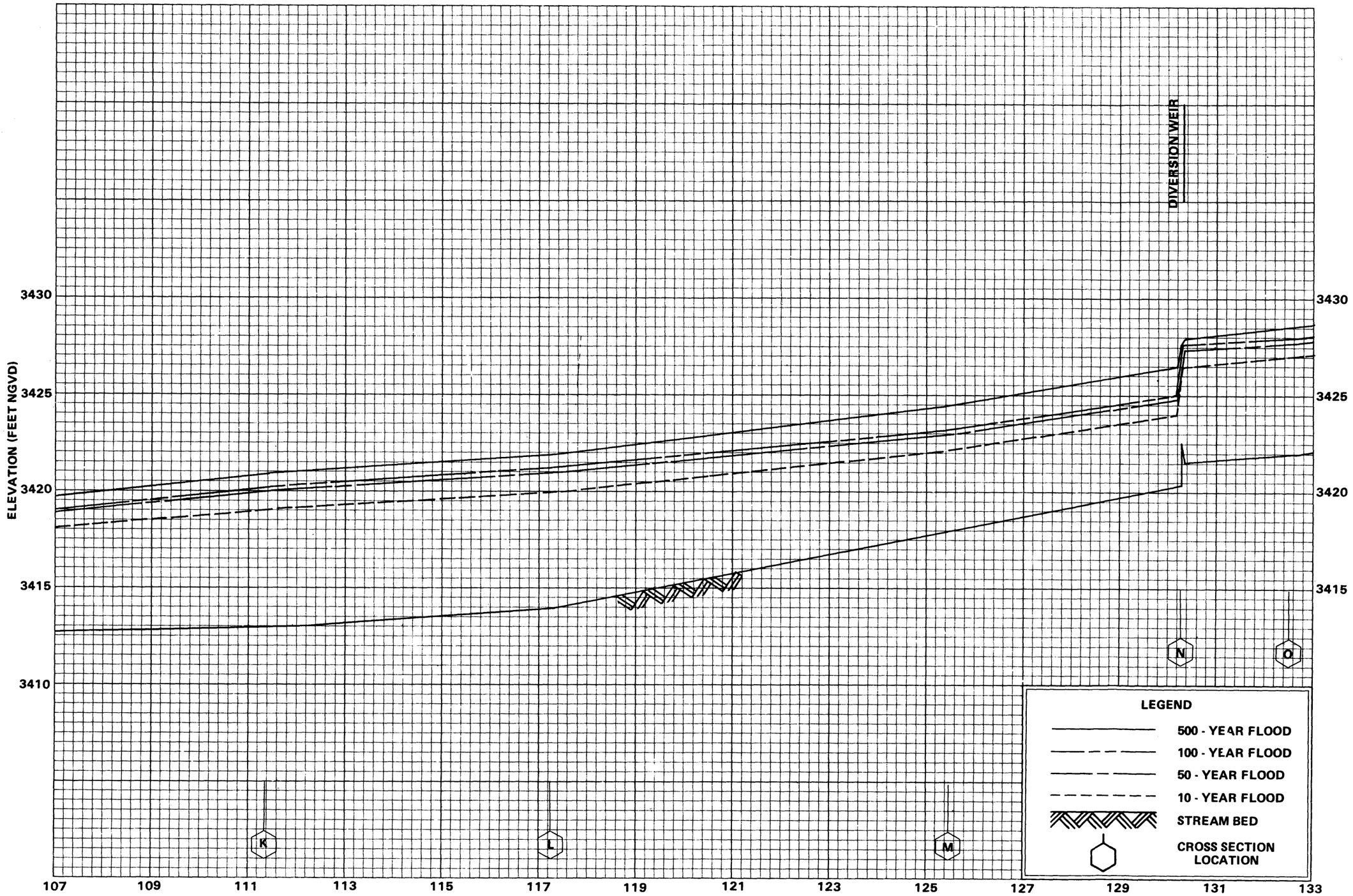
FLOOD PROFILES

POWDER RIVER (AT BAKER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR AND INCORPORATED AREAS

03P



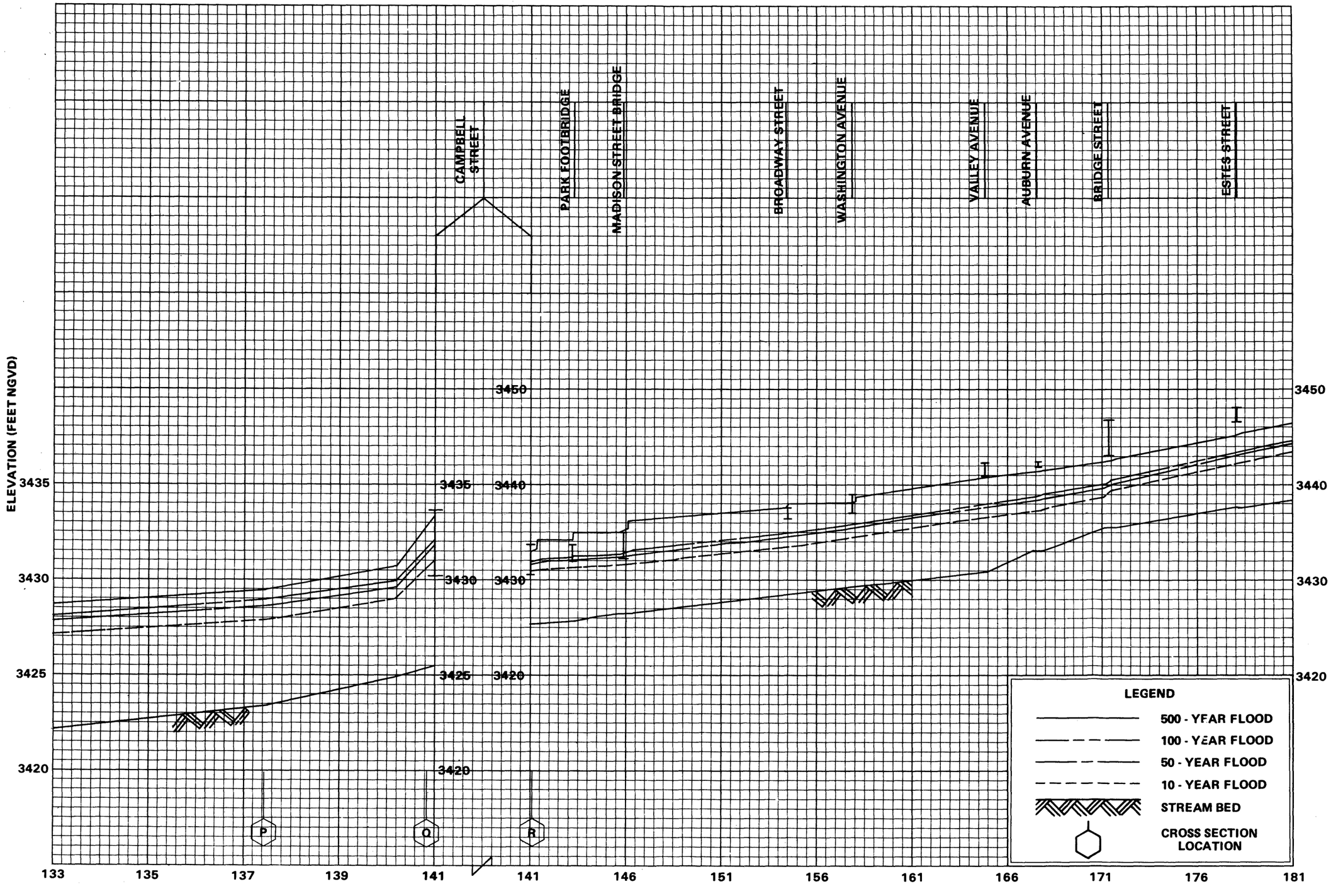
FLOOD PROFILES

POWDER RIVER (AT BAKER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

04P



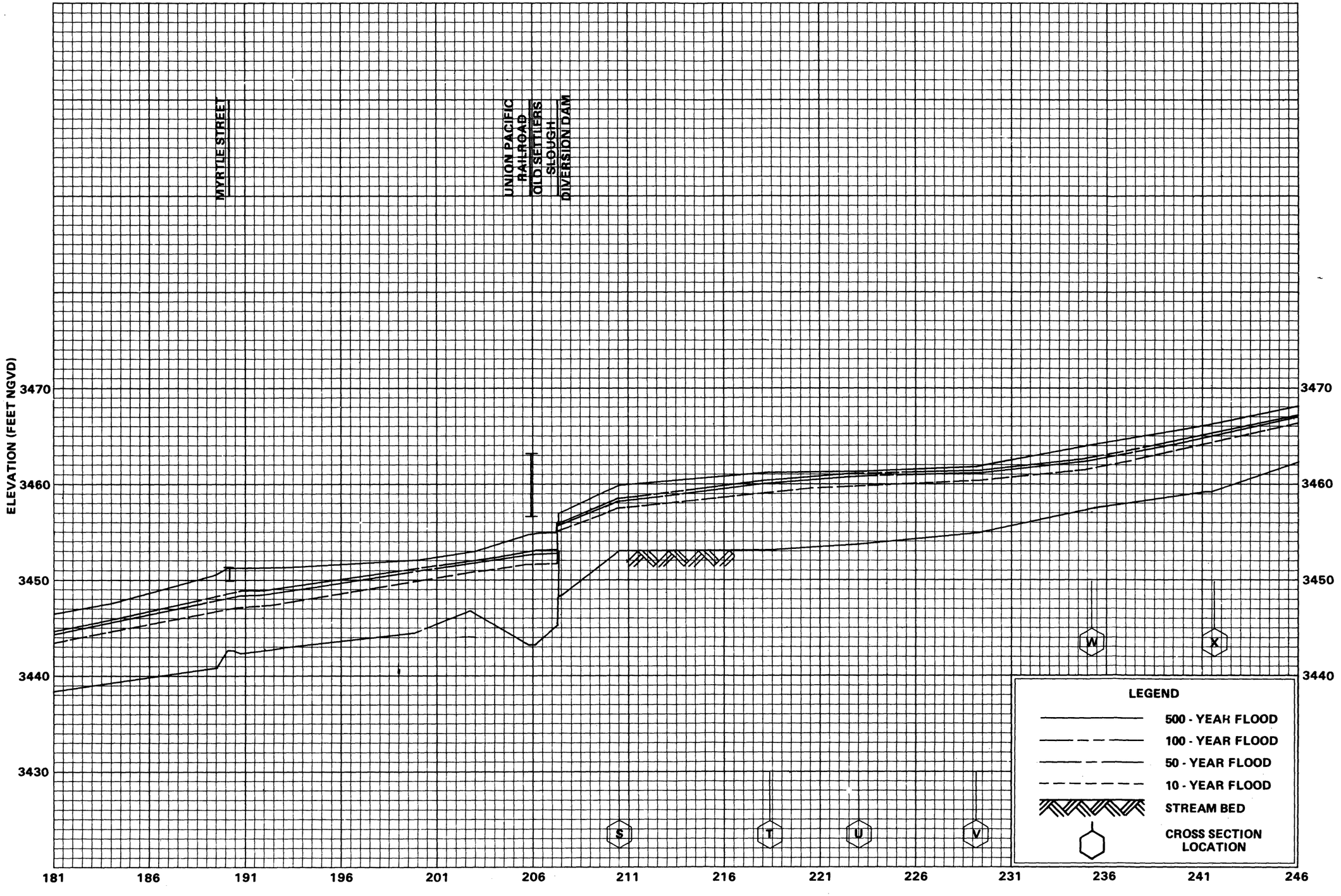
FLOOD PROFILES

POWDER RIVER (AT BAKER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR AND INCORPORATED AREAS

05P



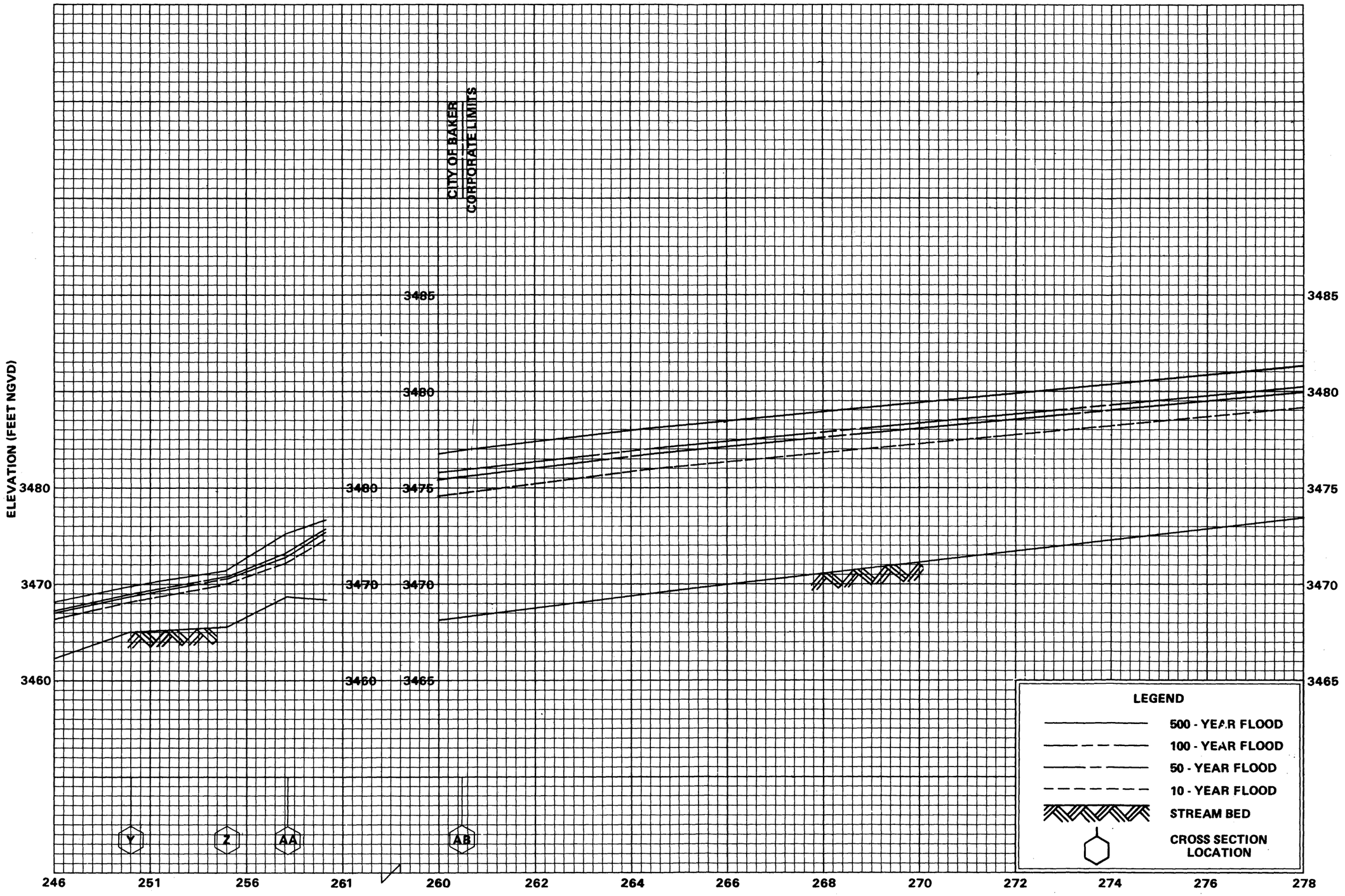
FLOOD PROFILES

POWDER RIVER (AT BAKER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

06P



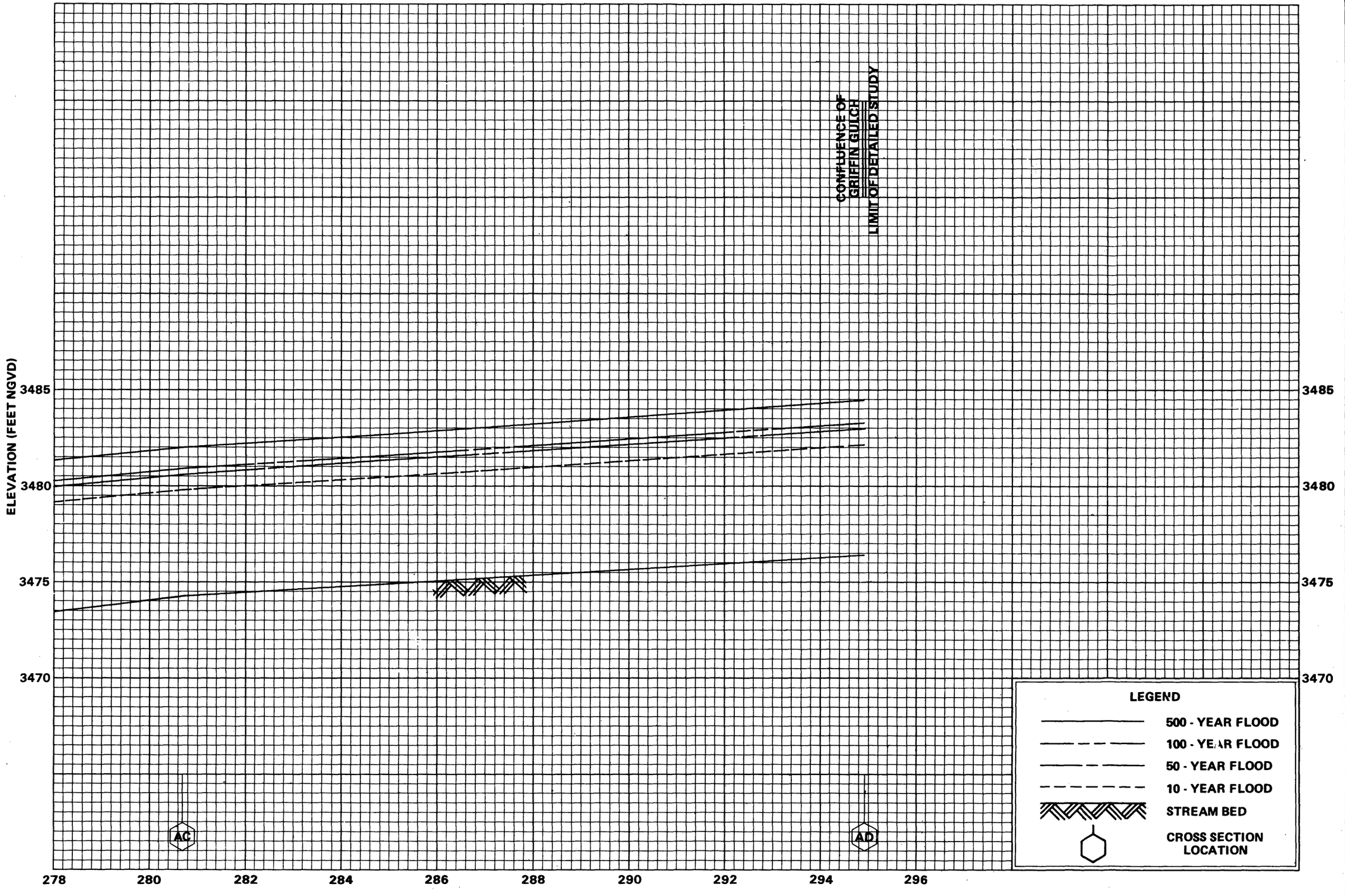
FLOOD PROFILES

POWDER RIVER (AT BAKER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

07P



FLOOD PROFILES

POWDER RIVER (AT BAKER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

08P

50 - AND 100 YEAR FLOODS COINCIDE

LIMIT OF DETAILED STUDY

ELEVATION (FEET NGVD)

3400

3395

3390

31 33 35 37 39 41 43 45 47 49 51 53 55

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE T 8/9 S ALONG PROFILE BASE LINE

FLOOD PROFILES

POWDER RIVER OVERFLOW A

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR AND INCORPORATED AREAS

09P

50 - AND 100 YEAR FLOODS COINCIDE

ELEVATION (FEET NGVD)

3410
3405
3400
3395

HUGHES LANE
CORPORATE LIMITS
CITY OF BAKER

D
F
G
H

LEGEND
500 - YEAR FLOOD
100 - YEAR FLOOD
50 - YEAR FLOOD
10 - YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

55 57 59 61 63 65 67 69 71 73 75 77 79 81

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE T 8/9 S ALONG PROFILE BASE LINE

FLOOD PROFILES

POWDER RIVER OVERFLOW A

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

10P

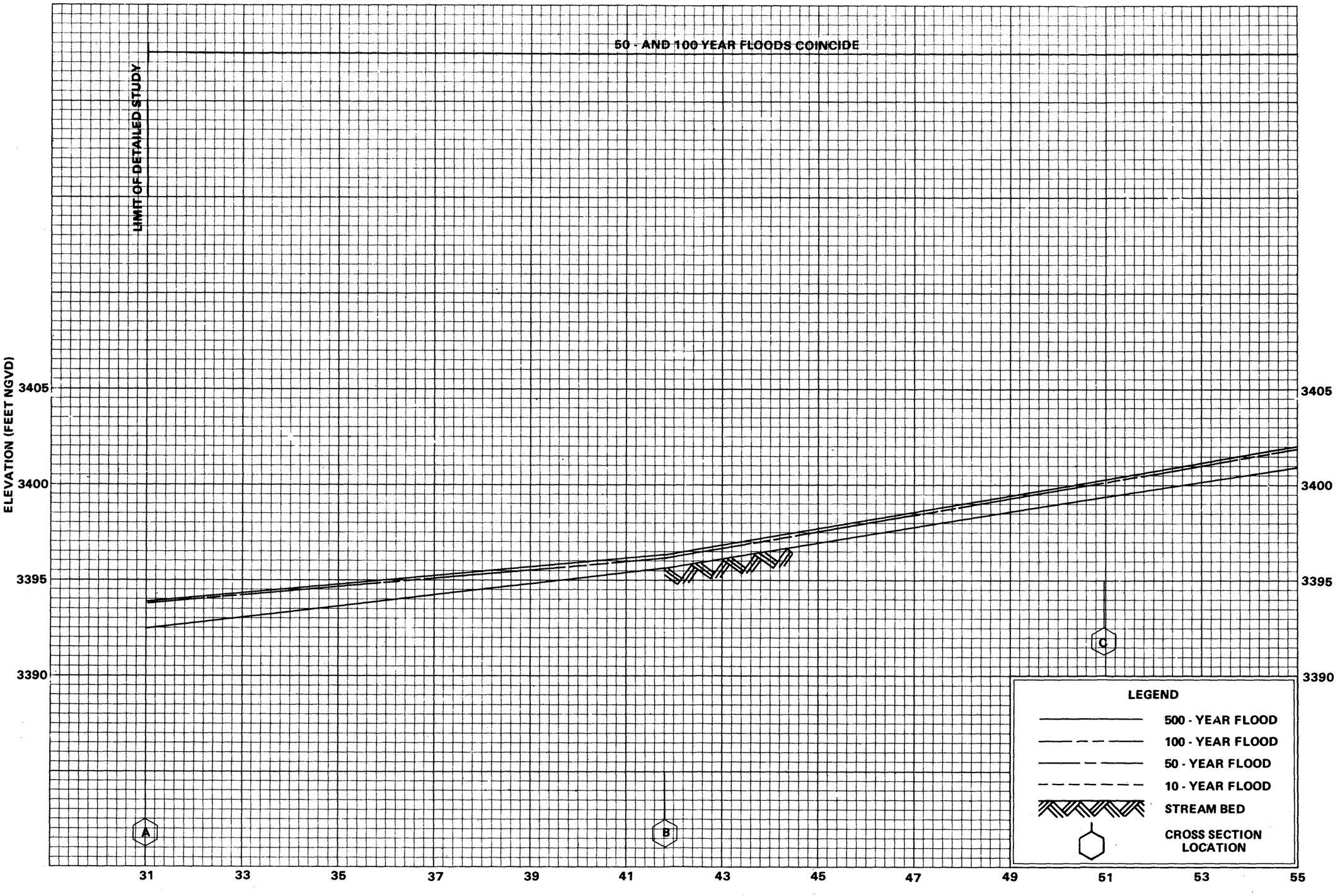
FLOOD PROFILES

POWDER RIVER OVERFLOW A

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

11P



FLOOD PROFILES

POWDER RIVER OVERFLOW B

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

12P

50 - AND 100 YEAR FLOODS COINCIDE

ELEVATION (FEET NGVD)

3405

3400

D

55 57 59 61 63

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE T 8/9 S ALONG PROFILE BASE LINE

LEGEND

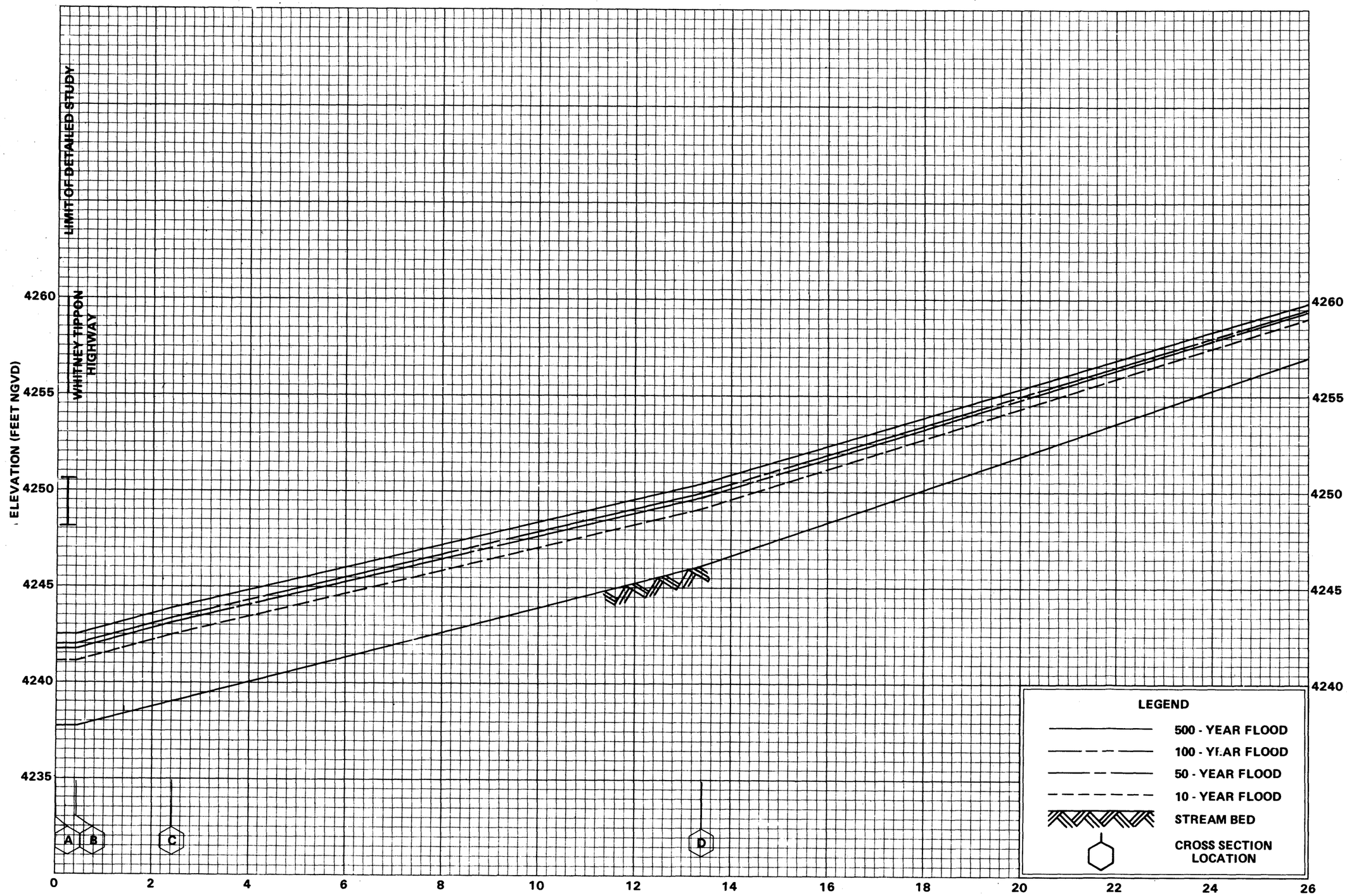
- 500 - YEAR FLOOD
- 100 - YEAR FLOOD
- 50 - YEAR FLOOD
- 10 - YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

POWDER RIVER OVERFLOW B

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR AND INCORPORATED AREAS

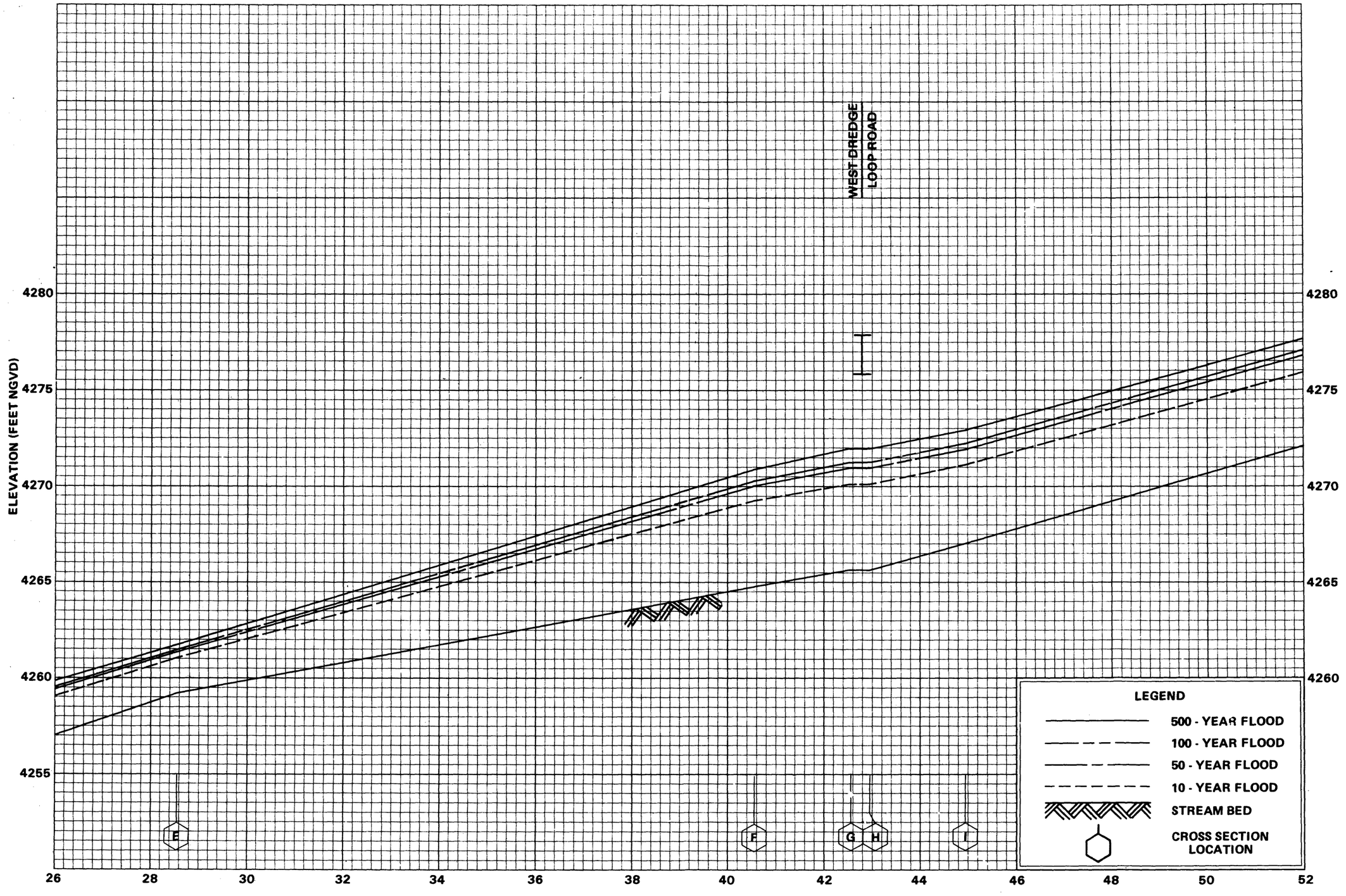


FLOOD PROFILES

POWDER RIVER (AT SUMPTER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS



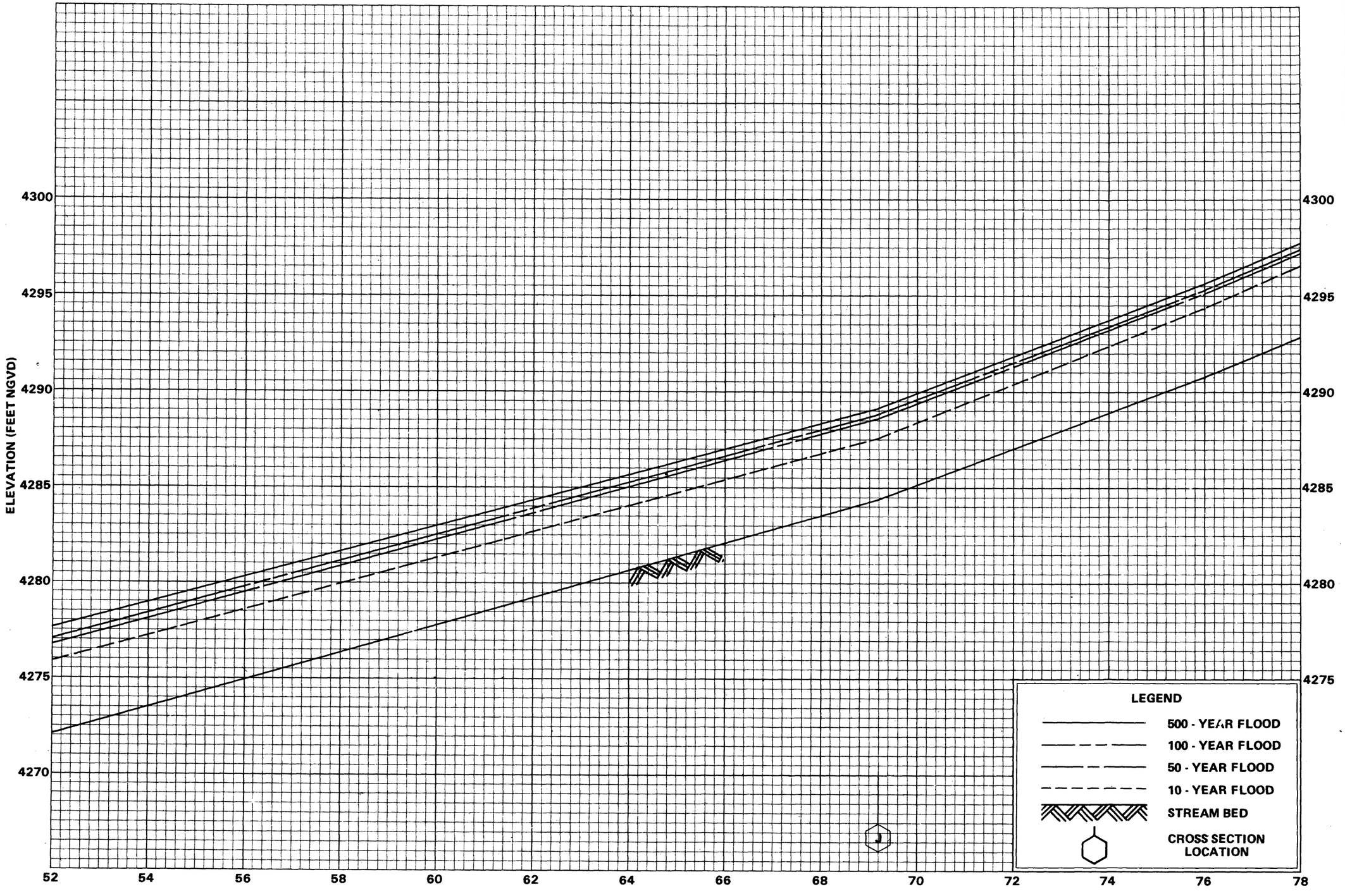
FLOOD PROFILES

POWDER RIVER (AT SUMPTER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

15P



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE DOWNSTREAM SIDE OF WHITNEY TIPPON HIGHWAY BRIDGE

FLOOD PROFILES

POWDER RIVER (AT SUMPTER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR AND INCORPORATED AREAS

16P

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE DOWNSTREAM SIDE OF WHITNEY TIPPON HIGHWAY BRIDGE

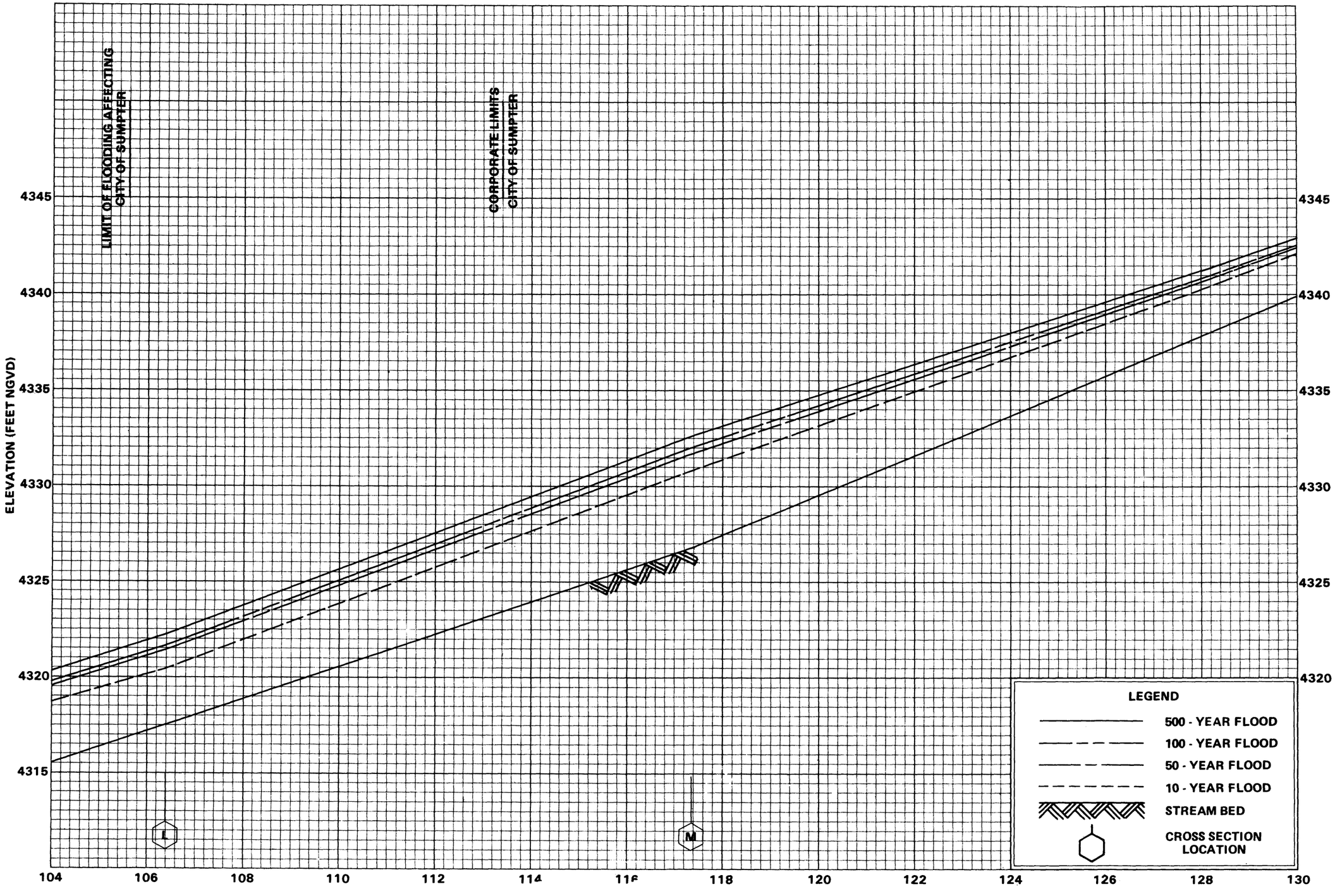
FLOOD PROFILES

POWDER RIVER (AT SUMPTER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

17P



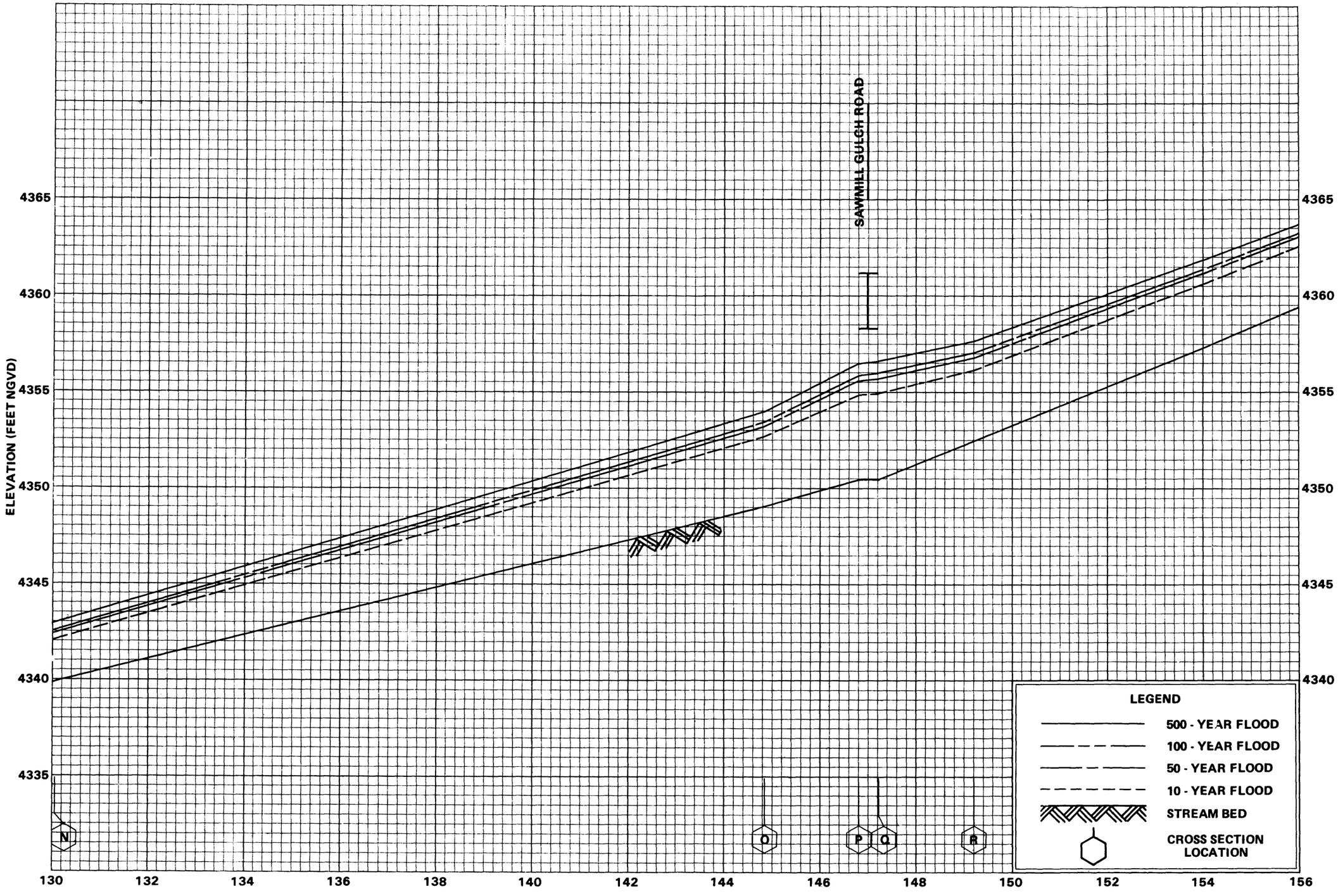
FLOOD PROFILES

POWDER RIVER (AT SUMPTER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

18P

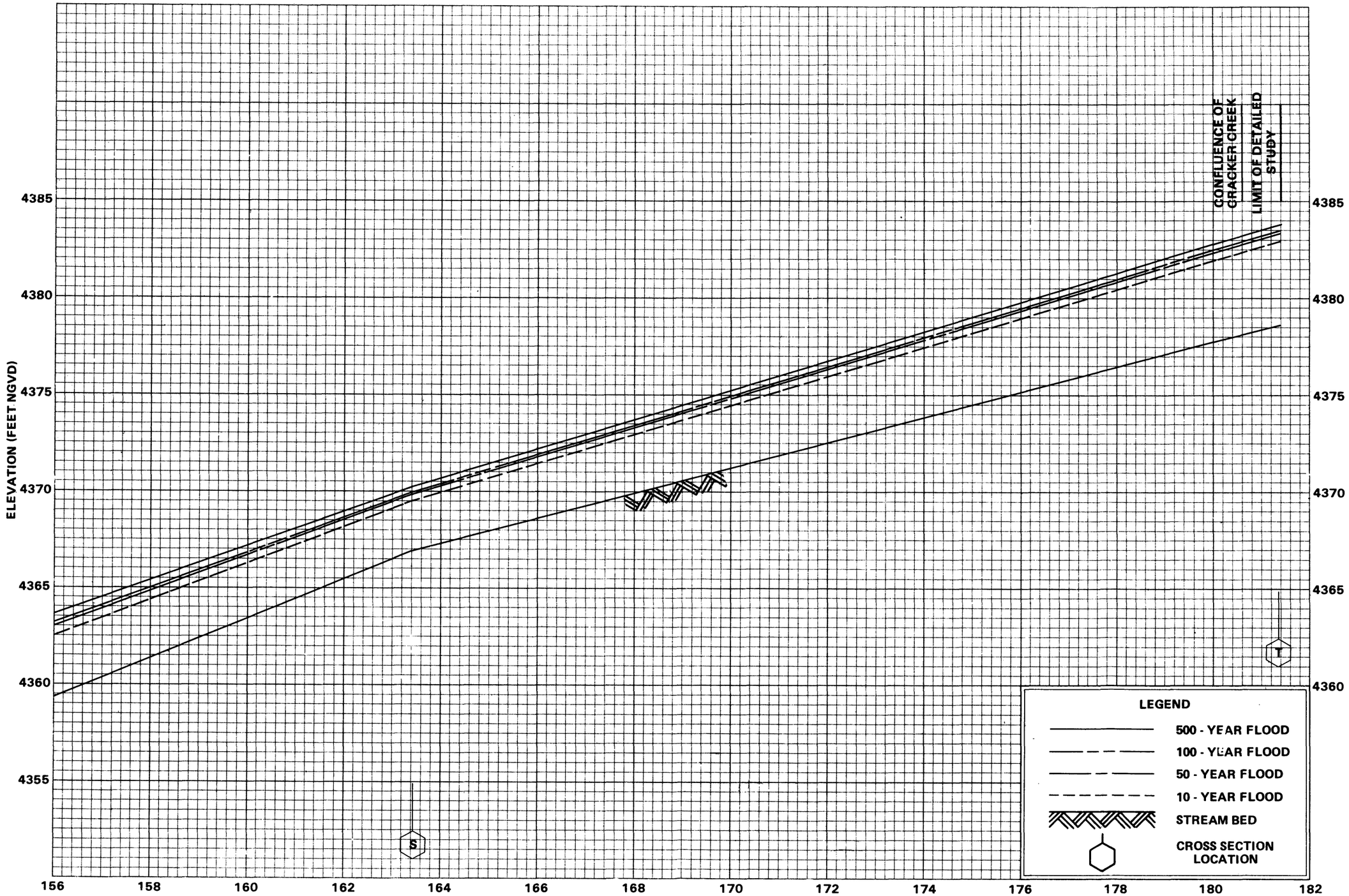


FLOOD PROFILES

POWDER RIVER (AT SUMPTER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

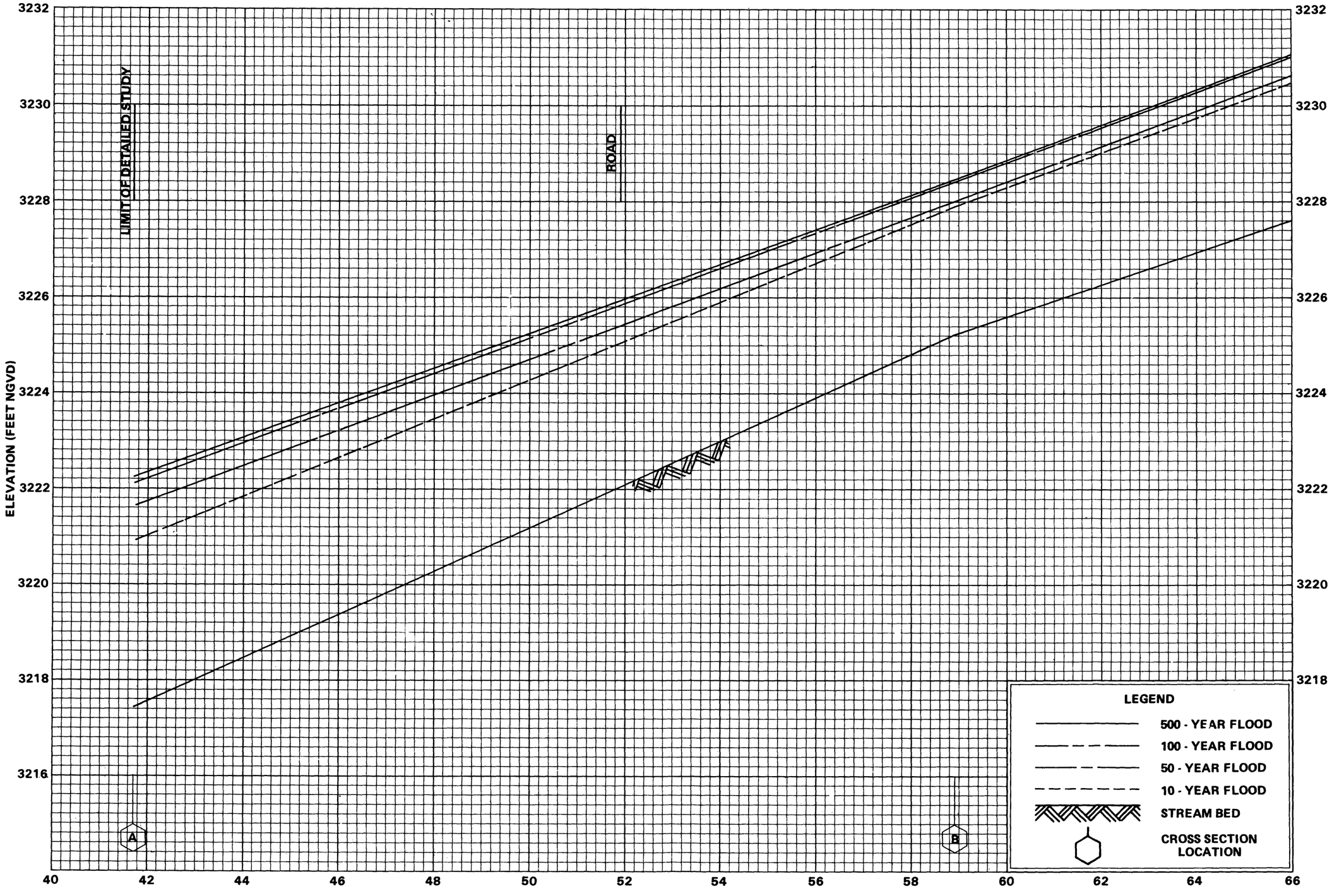


FLOOD PROFILES

POWDER RIVER (AT SUMPTER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR AND INCORPORATED AREAS



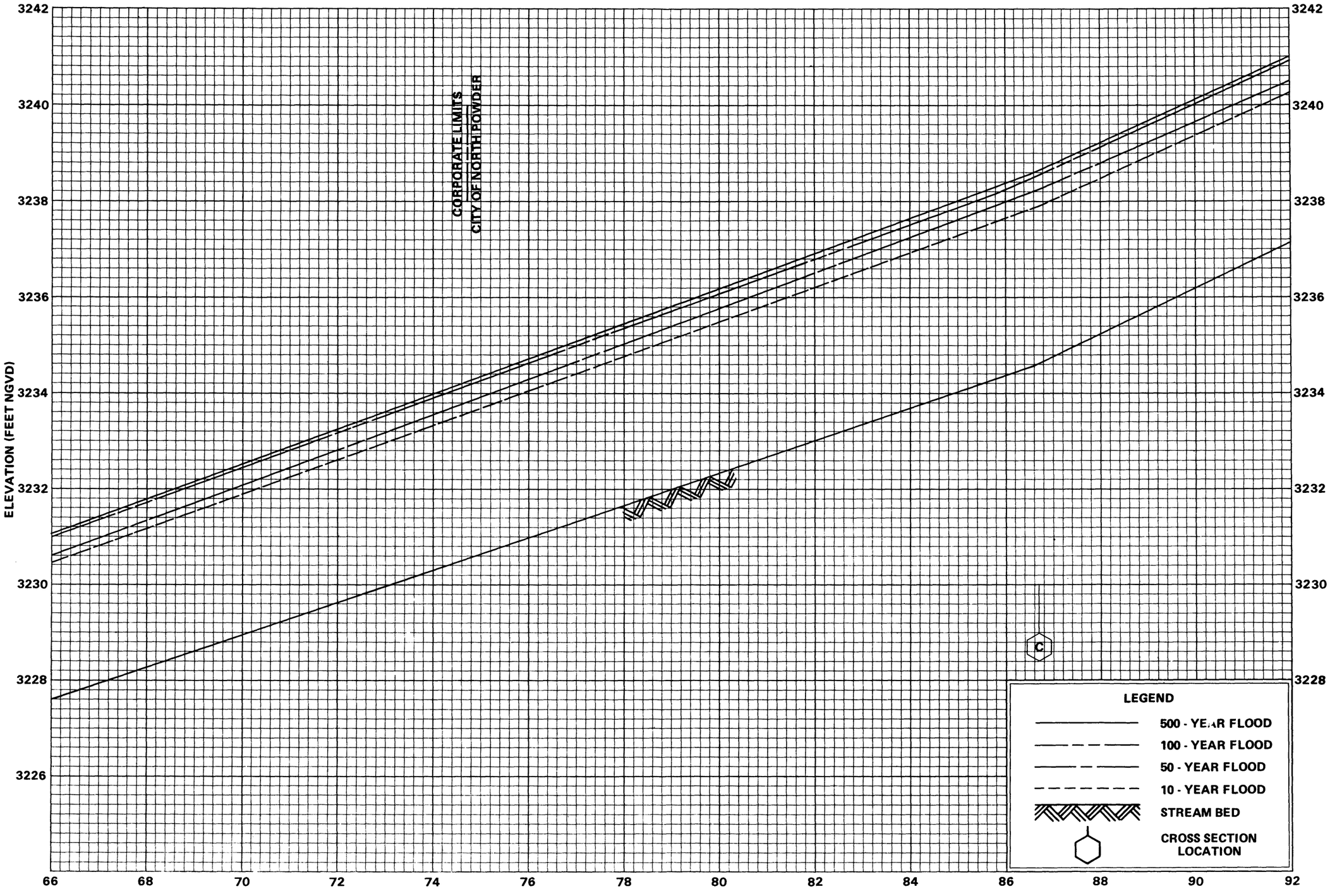
FLOOD PROFILES

NORTH POWDER RIVER (AT NORTH POWDER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

21P



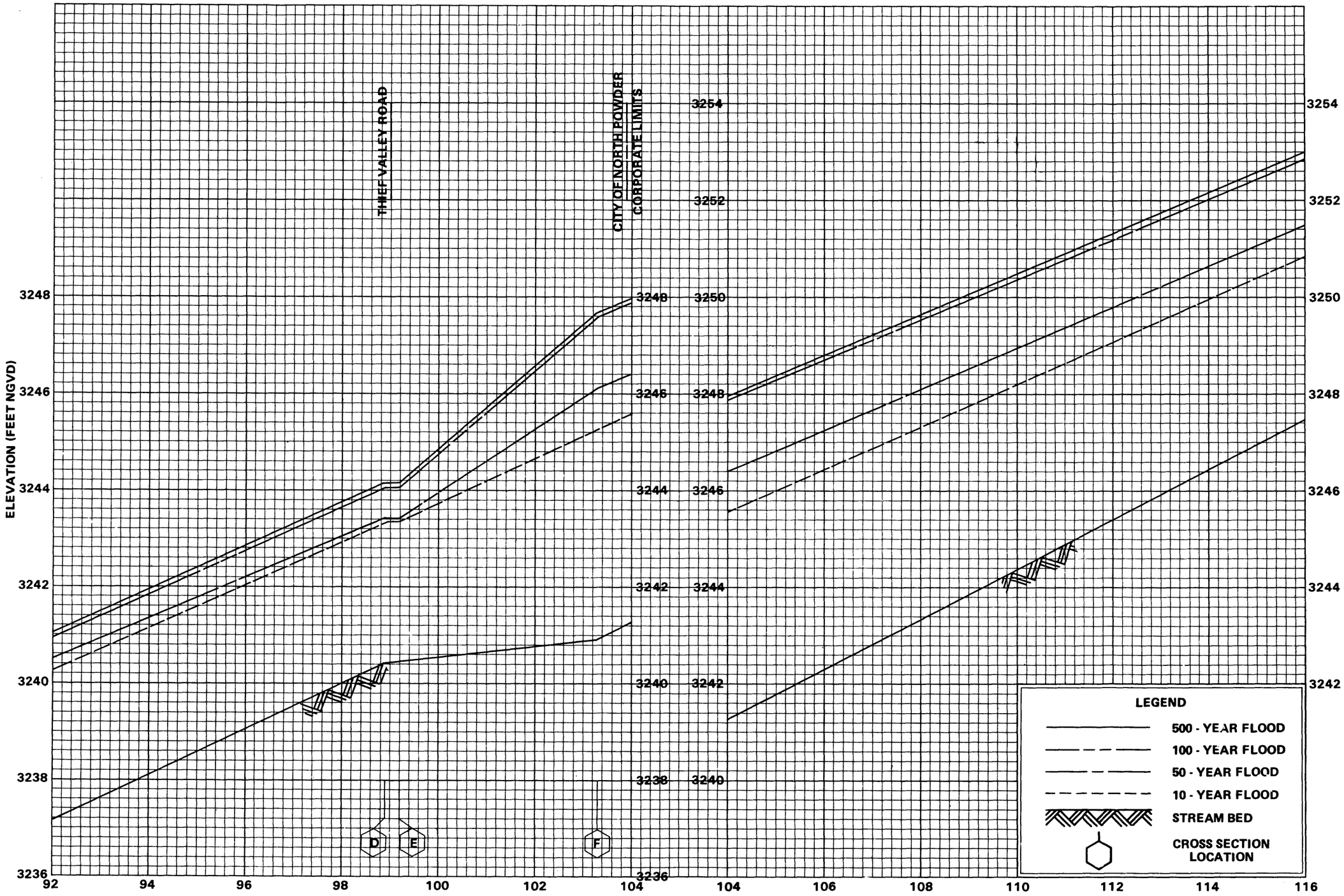
FLOOD PROFILES

NORTH POWDER RIVER (AT NORTH POWDER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

22P

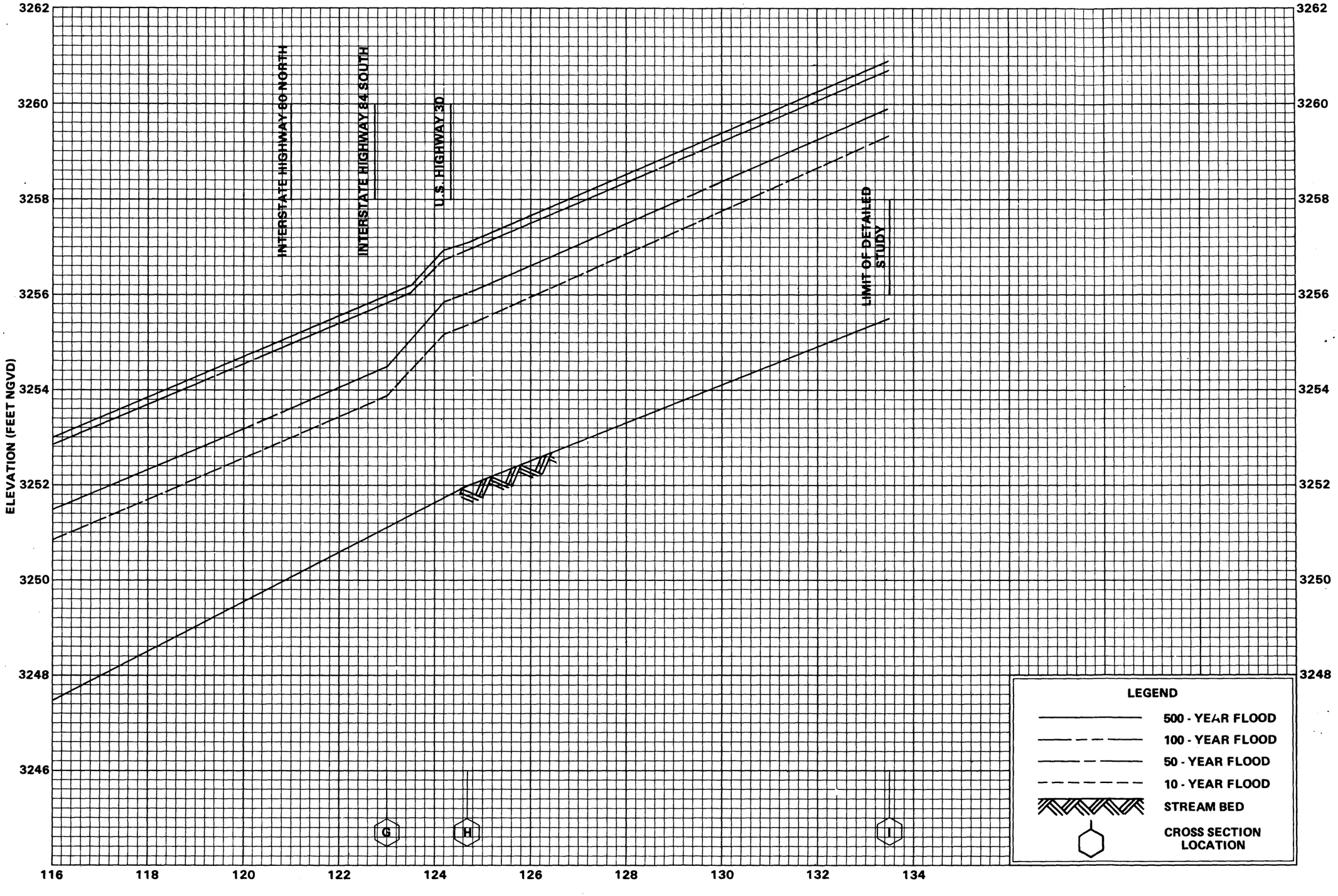


FLOOD PROFILES

NORTH POWDER RIVER (AT NORTH POWDER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR AND INCORPORATED AREAS

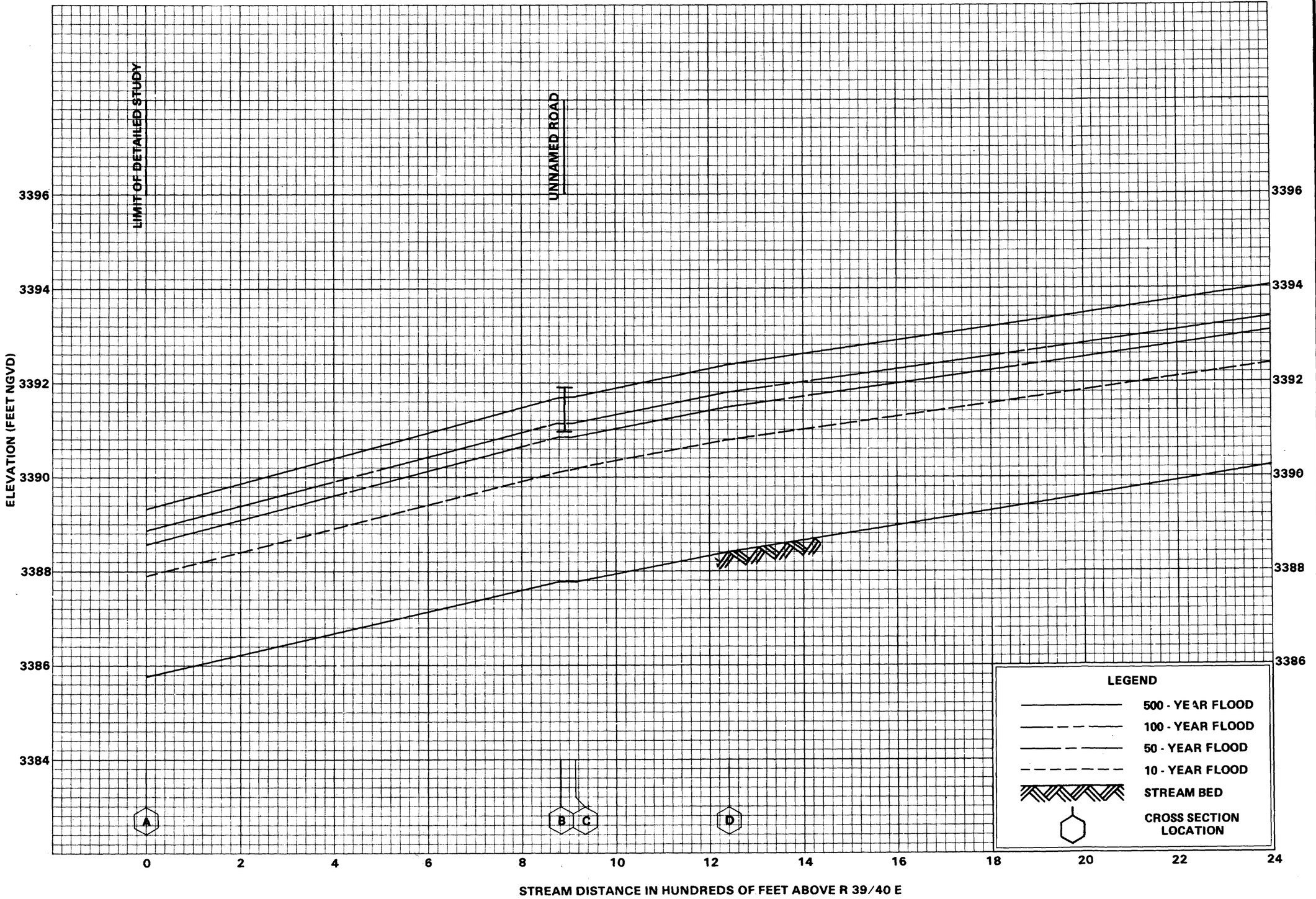


FLOOD PROFILES

NORTH POWDER RIVER (AT NORTH POWDER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS



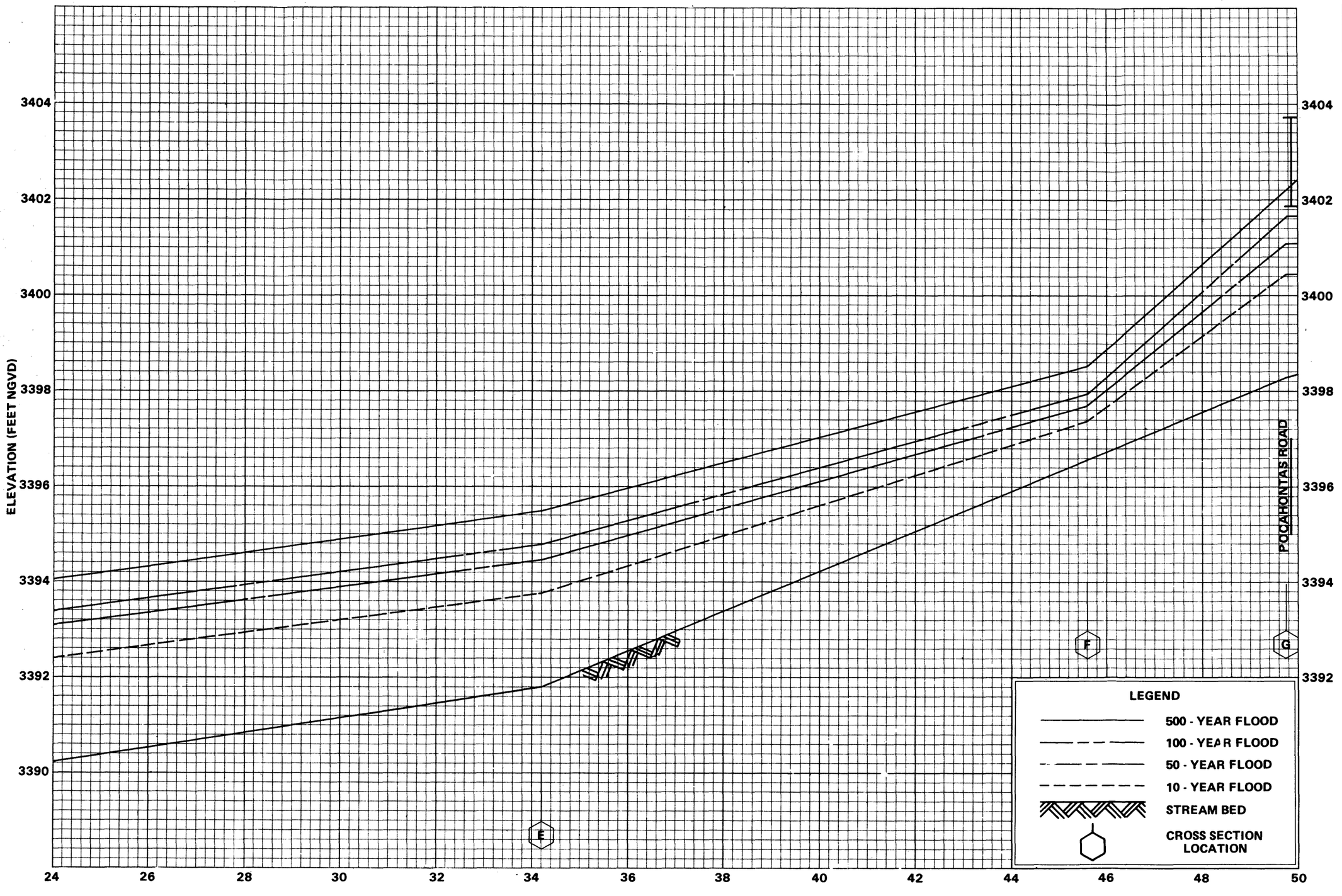
FLOOD PROFILES

OLD SETTLER'S SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

25P

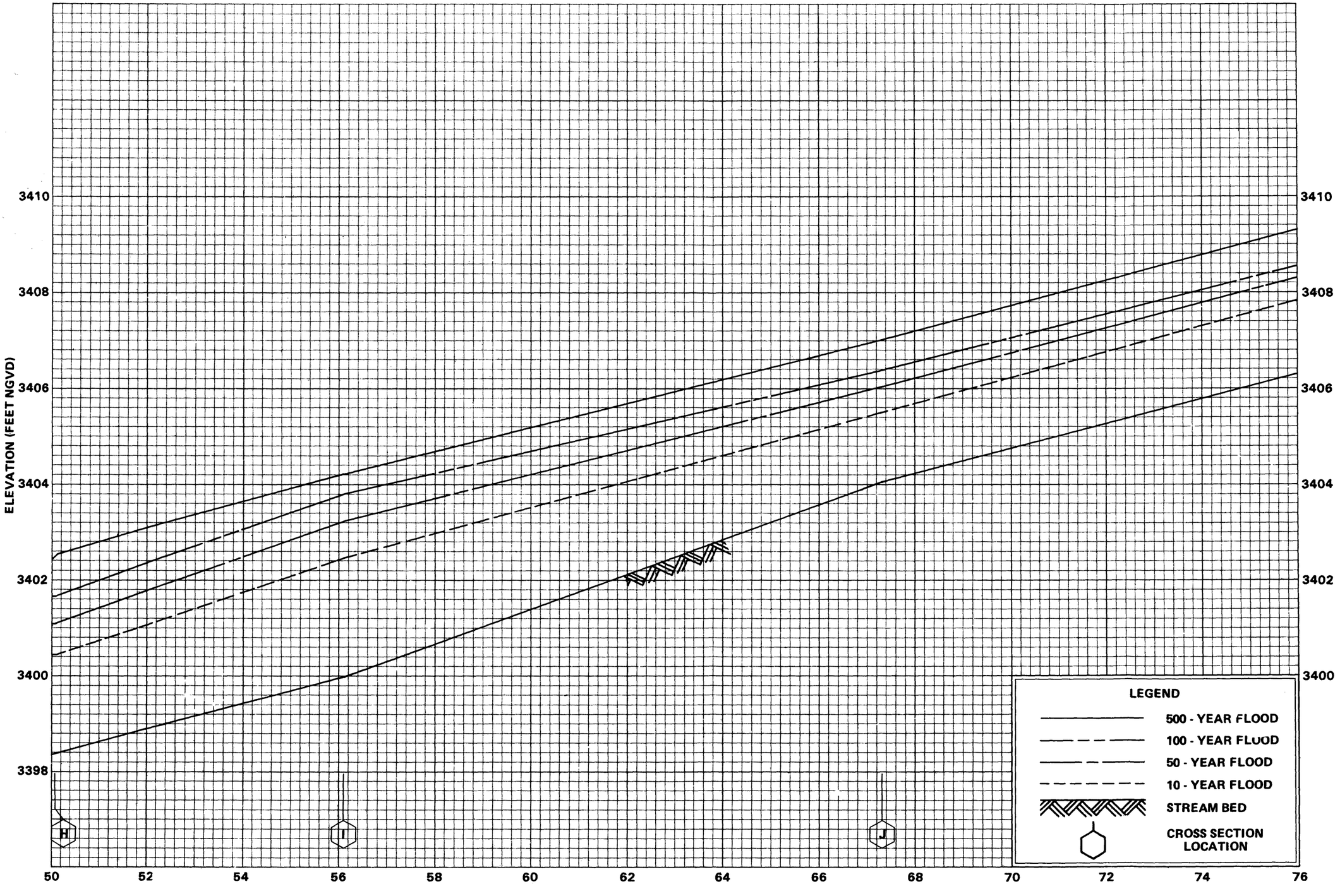


FLOOD PROFILES

OLD SETTLER'S SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS



FLOOD PROFILES

OLD SETTLER'S SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

50-, AND 100 - YEAR FLOODS COINCIDE

CORPORATE LIMITS
CITY OF BAKER

ELEVATION (FEET NGVD)

3414
3412
3410
3408
3406

3414 3430
3412 3420
3410 3410
3408
3406

3430
3420
3410

K
L
M

LEGEND
500 - YEAR FLOOD
100 - YEAF. FLOOD
50 - YEAR FLOOD
10 - YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

76 78 80 82 84 86 88 90 90 95 100 105 110 115

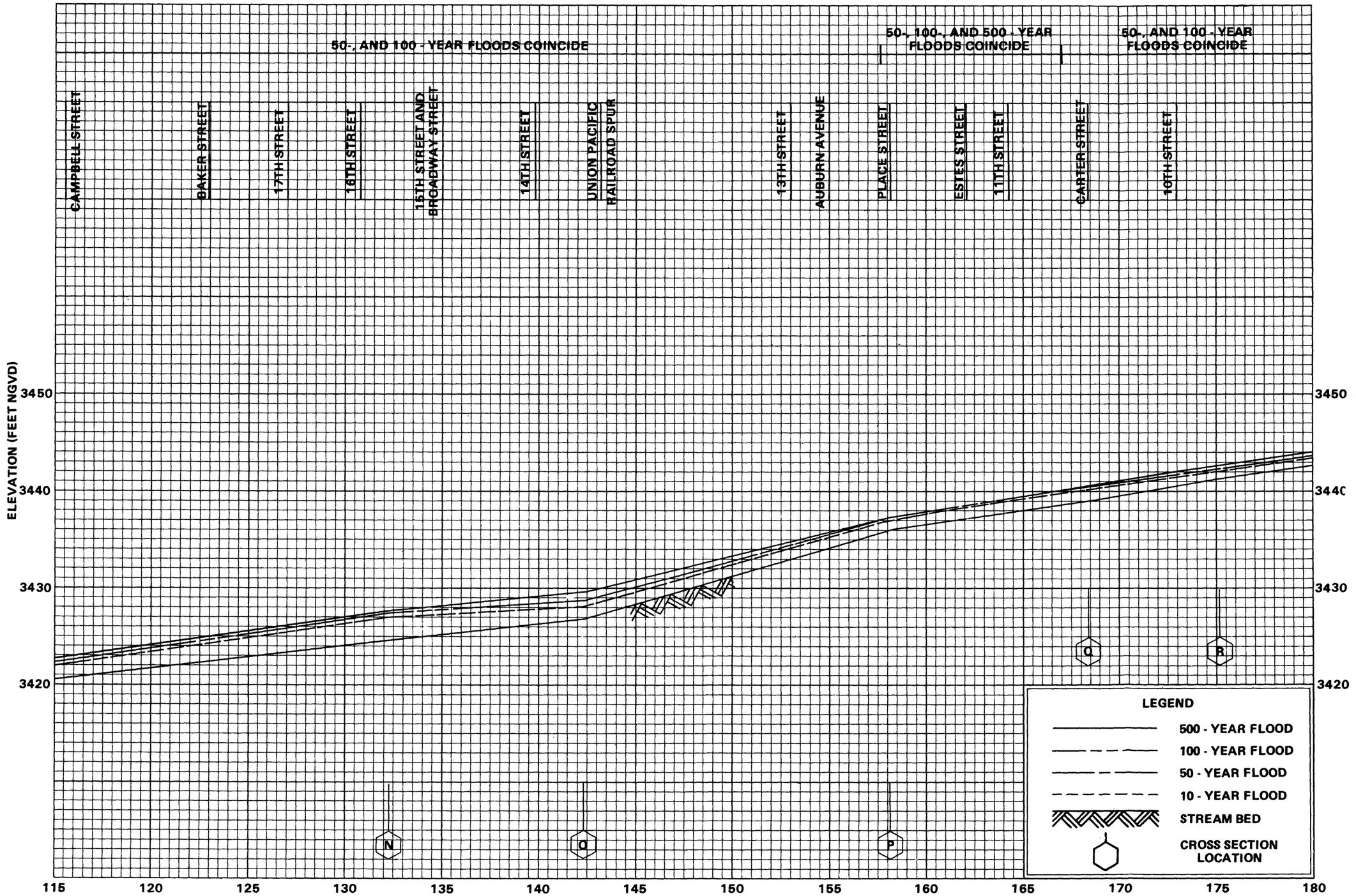
STREAM DISTANCE IN HUNDREDS OF FEET ABOVE R 39/40 E

FLOOD PROFILES

OLD SETTLER'S SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

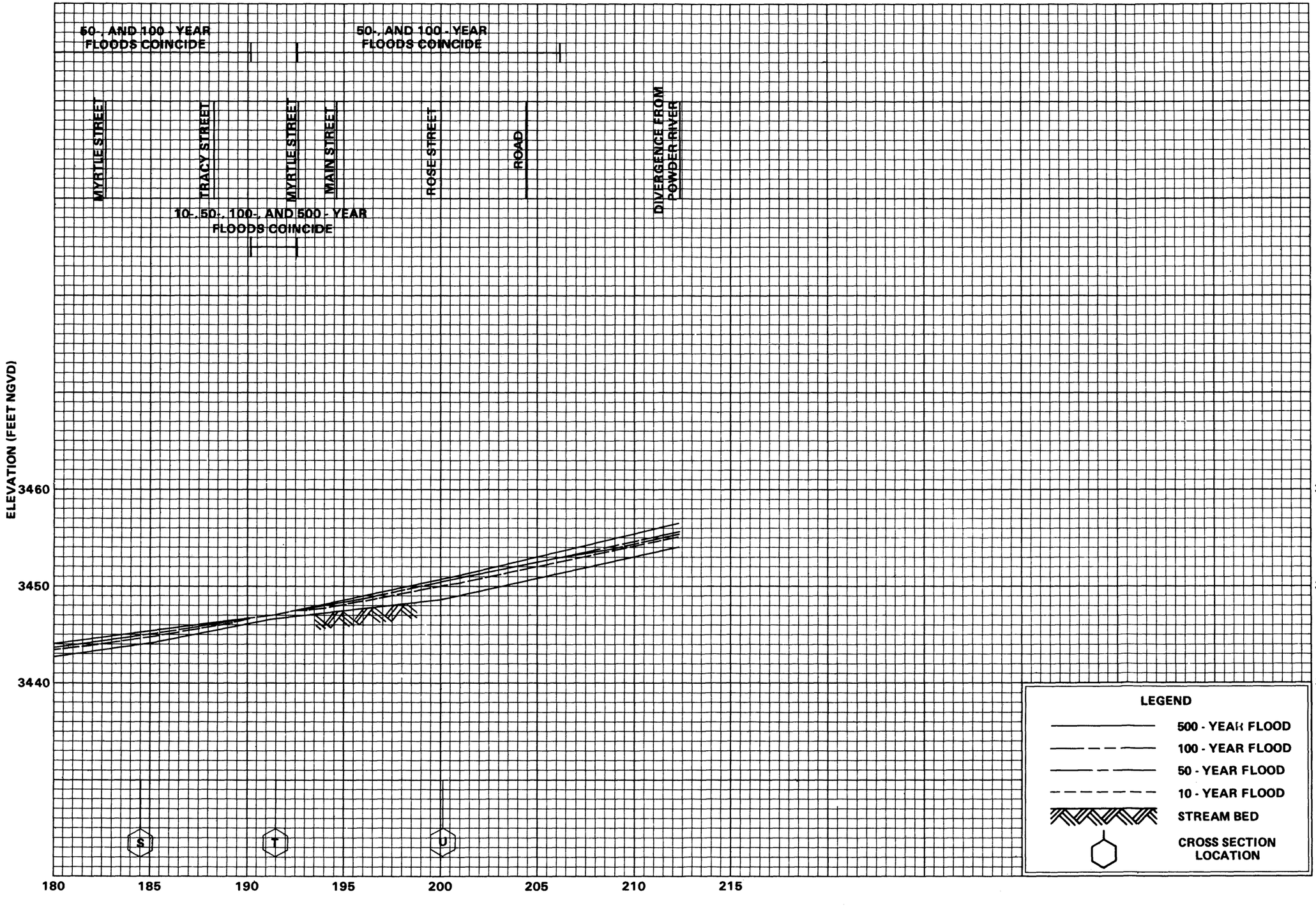


FLOOD PROFILES

OLD SETTLER'S SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS



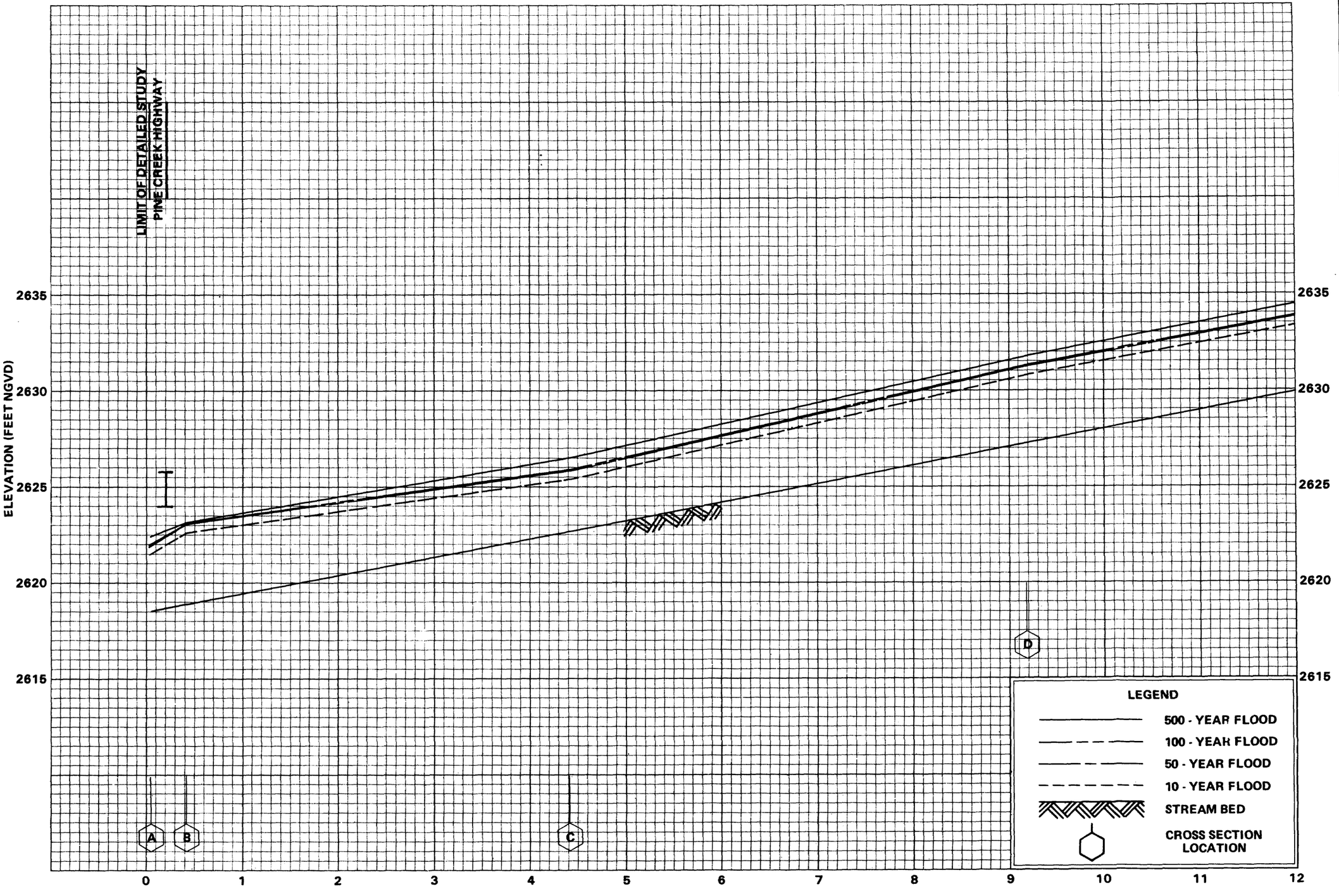
FLOOD PROFILES

OLD SETTLER'S SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

30P



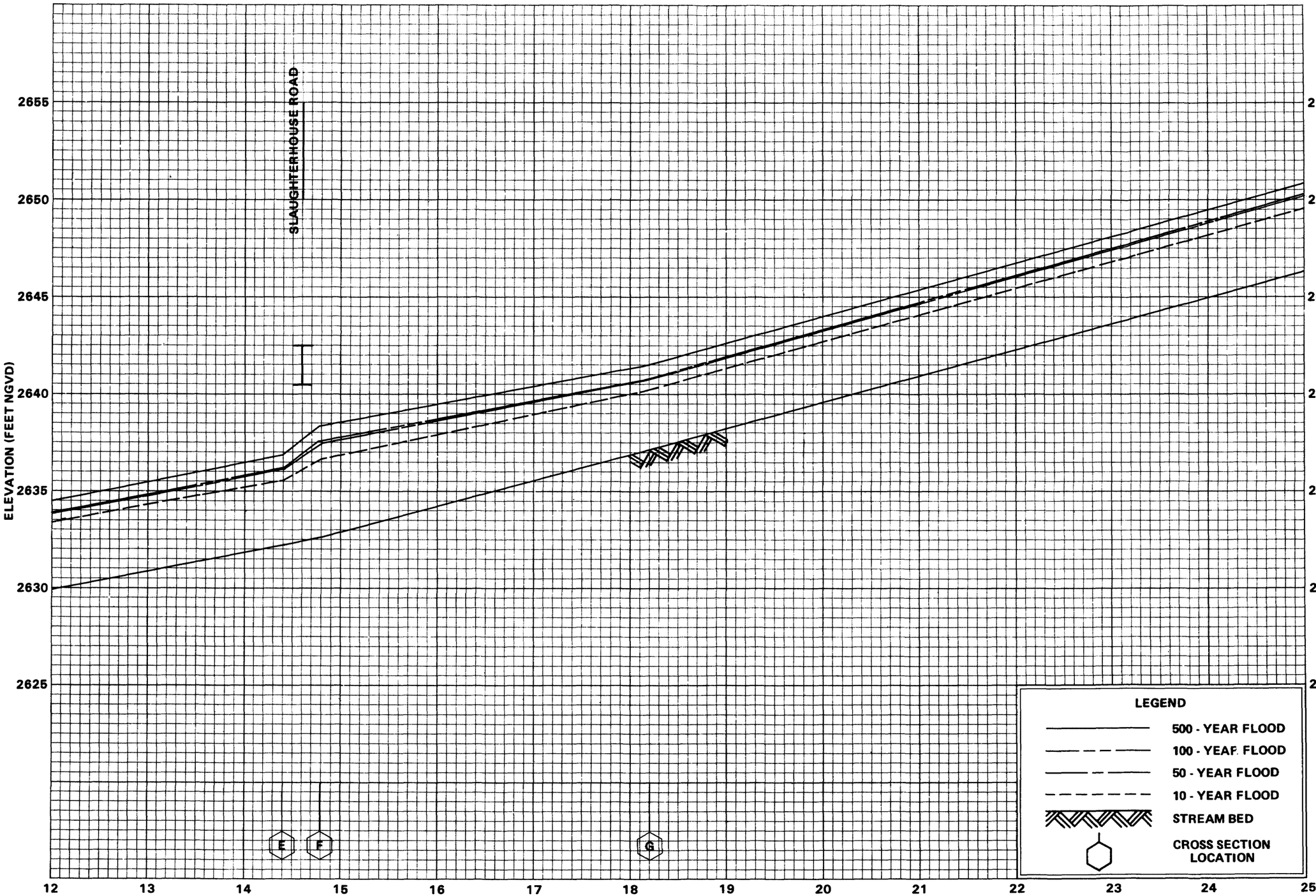
FLOOD PROFILES

PINE CREEK (AT HALFWAY)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

31P



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE DOWNSTREAM SIDE OF PINE CREEK HIGHWAY BRIDGE

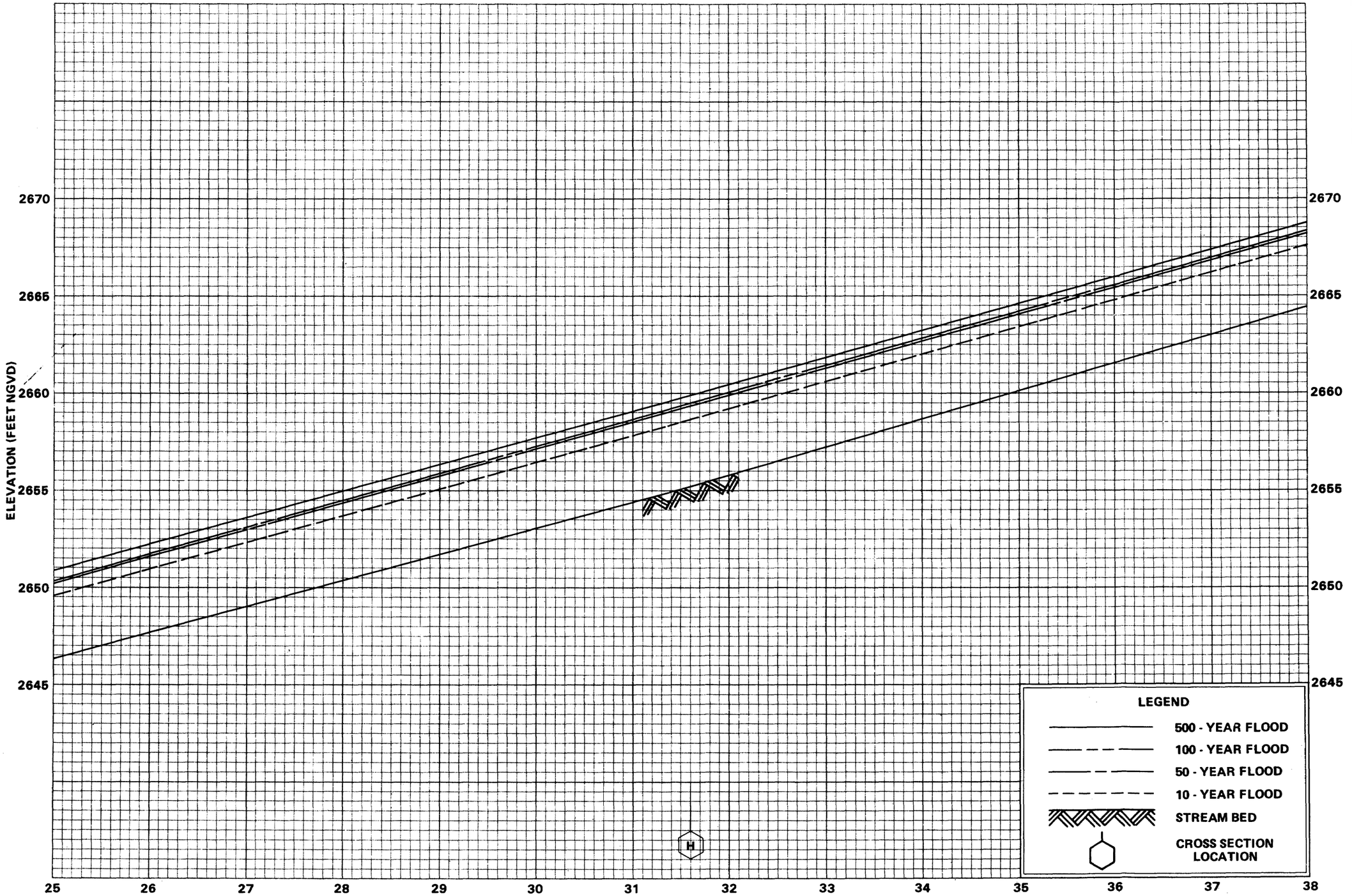
FLOOD PROFILES

PINE CREEK (AT HALFWAY)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

32P



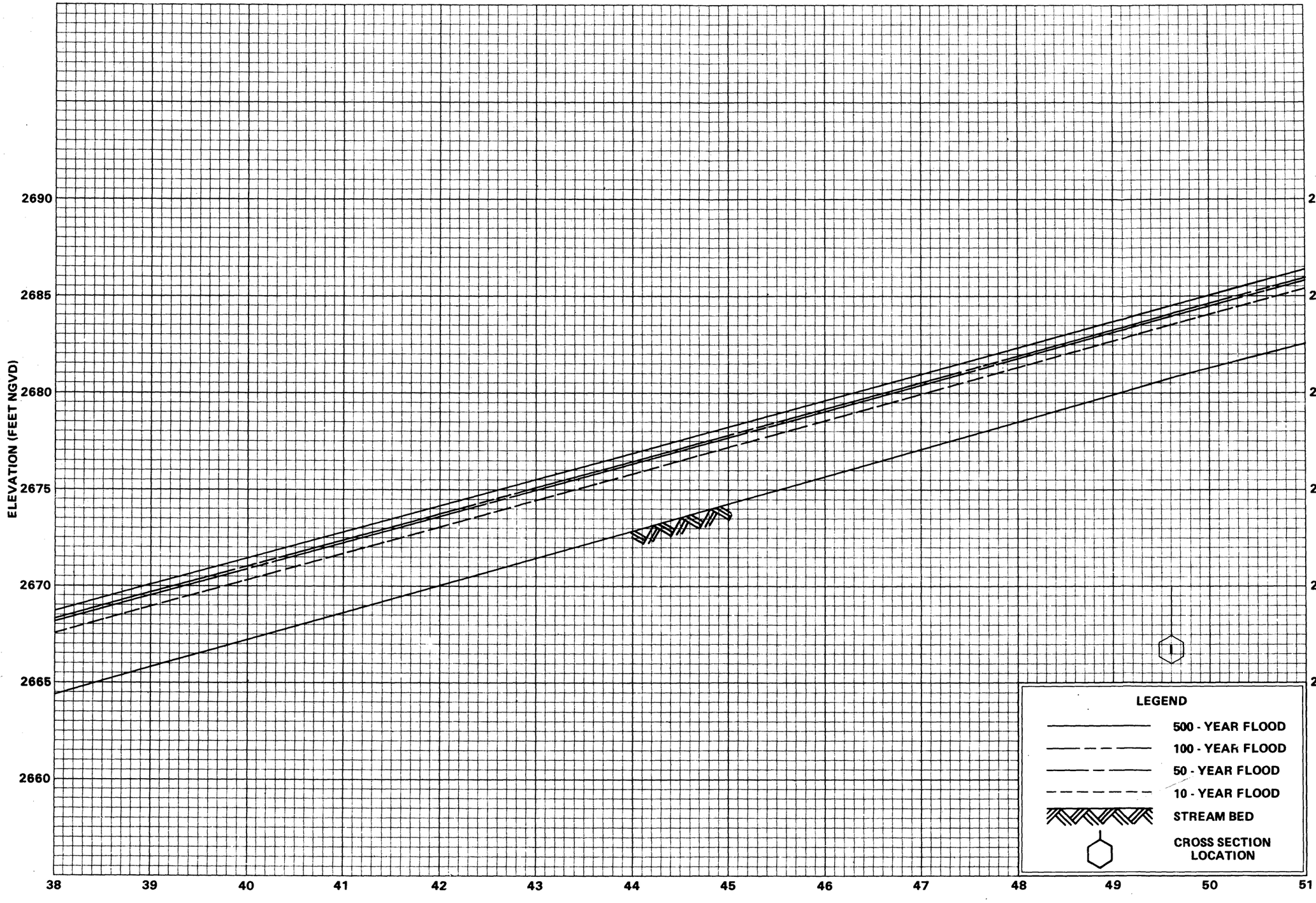
STREAM DISTANCE IN HUNDREDS OF FEET ABOVE DOWNSTREAM SIDE OF PINE CREEK HIGHWAY BRIDGE

FLOOD PROFILES

PINE CREEK (AT HALFWAY)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS



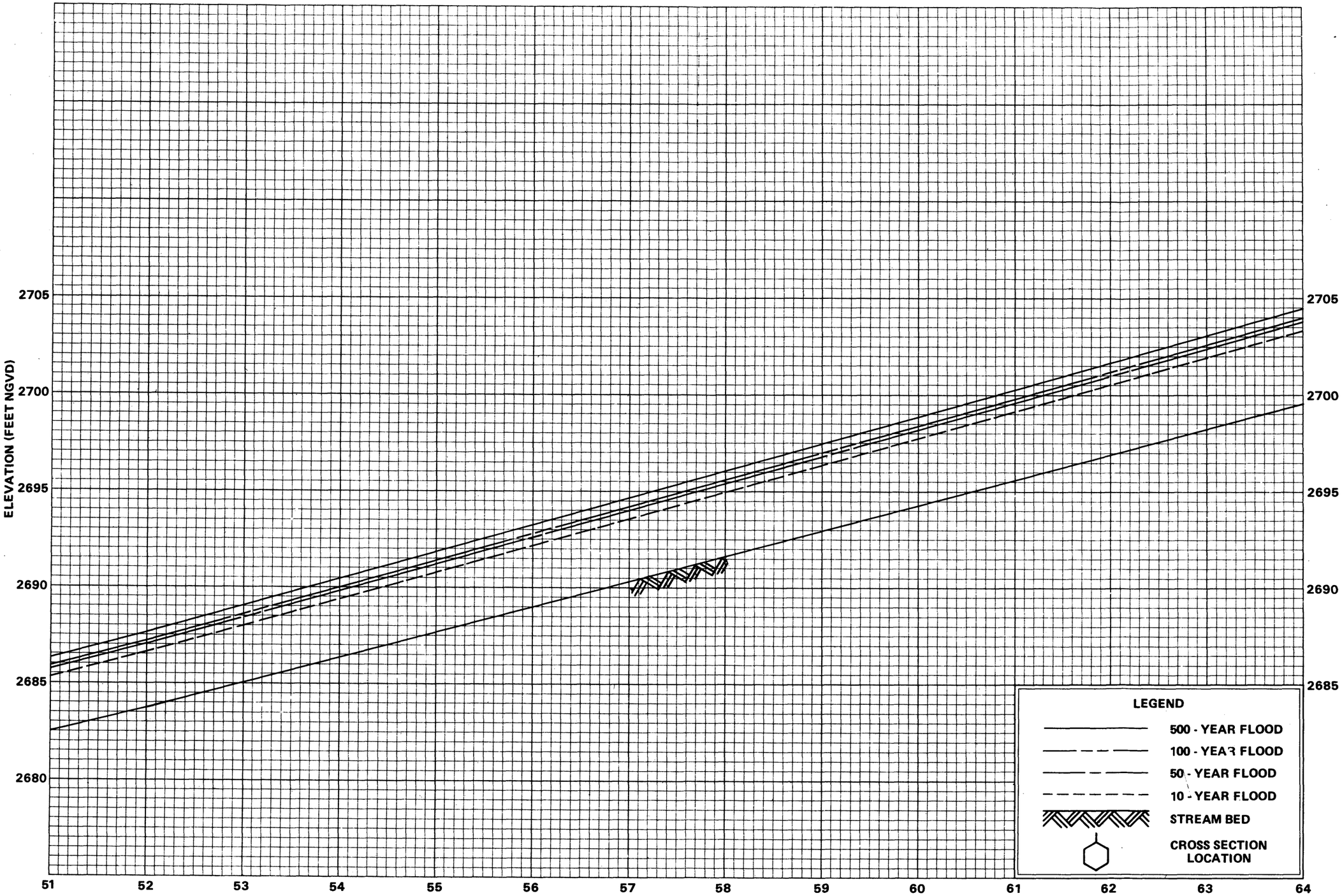
FLOOD PROFILES

PINE CREEK (AT HALFWAY)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS

34P

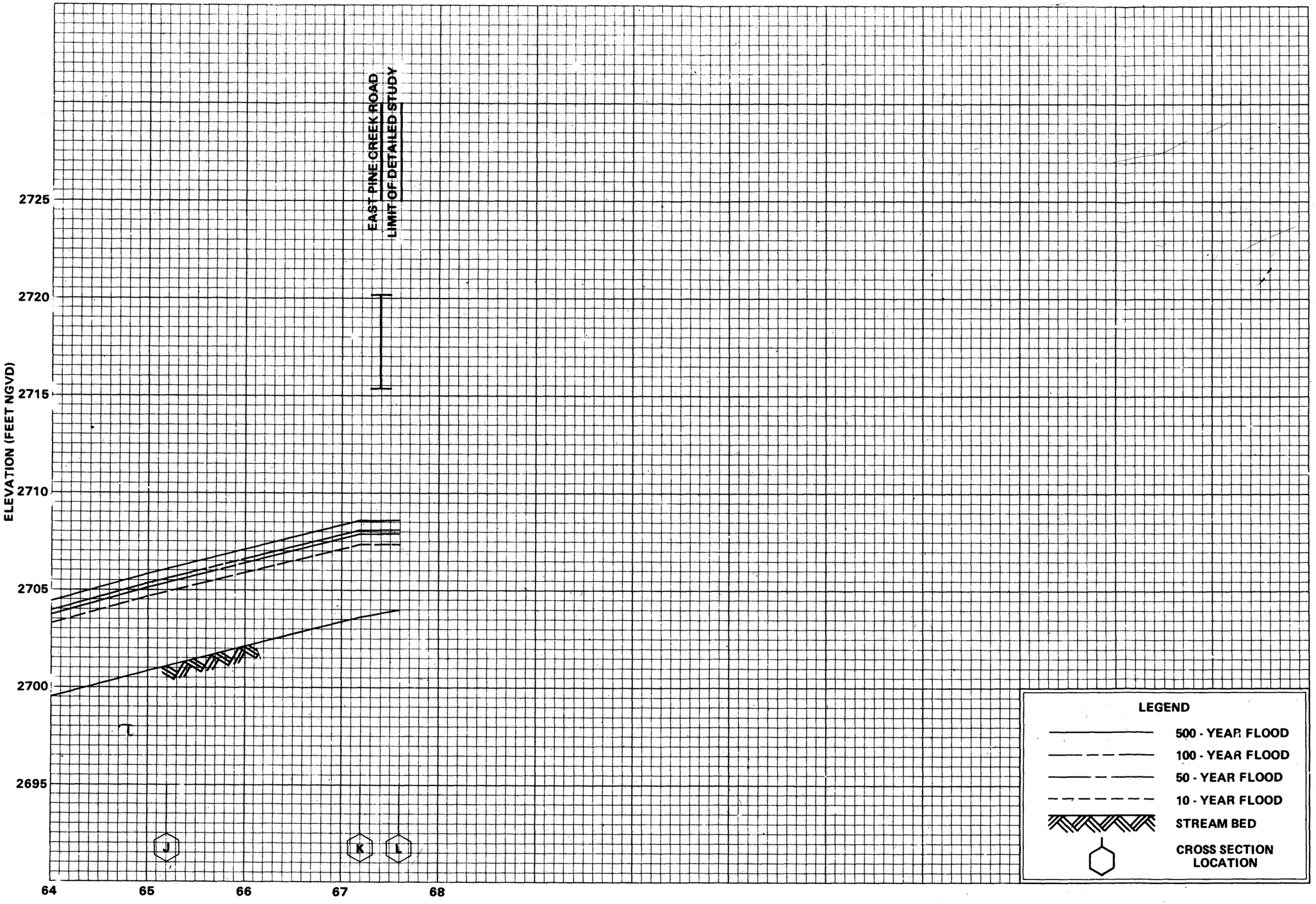


FLOOD PROFILES

PINE CREEK (AT HALFWAY)

FEDERAL EMERGENCY MANAGEMENT AGENCY

BAKER COUNTY, OR
AND INCORPORATED AREAS



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE DOWNSTREAM SIDE OF PINE CREEK HIGHWAY BRIDGE

FLOOD PROFILES

PINE CREEK (AT HALFWAY)

FEDERAL EMERGENCY MANAGEMENT AGENCY

**BAKER COUNTY, OR
AND INCORPORATED AREAS**

EXHIBIT 3 - ELEVATION REFERENCE MARKS
BAKER COUNTY, OREGON, AND INCORPORATED AREAS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 1	4249.82	An Oregon State Highway Department brass disk set in the top southeast corner of a concrete bridge abutment. Located from the post office in Sumpter 2.9 miles southeast along Highway 220 to an intersection with a highway to Whitney, 0.5 mile west to the bridge over the Powder River.
RM 2	4249.22	A USGS brass disk stamped "15-HLS 1972, 4249," 1.0 foot below edge of pavement. Located 2.9 miles southeast of the post office in Sumpter along Highway 220 to an intersection with a highway to Whitney, 0.08 mile northeast along highway 220 on the north edge of pavement.
RM 3	4308.82	A USGS brass disk stamped "16-HLS 1972, 4309," set in a rock outcrop on the northeast end. Located from the post office in Sumpter 2.0 miles southeast along Highway 220 to an intersection with a road south to Whitney, 208 feet southeast of road and 168 feet southwest of Highway 220.
RM 4	4340.87	A 1/2-inch rebar with plastic cap at the base of a post. Located from the post office in Sumpter 0.35 mile south along Highway 220 to an intersection with Sawmill Gulch Road, 0.35 mile southwest to a dirt road intersection, and 0.8 mile along the dirt road on the left.
RM 5	4329.81	A USGS brass disk stamped "17-HLS 1972, 4330," set on a copper rod. Located 1.05 miles south-southeast of the post office in Sumpter, and 65 feet northeast of Highway 220.
RM 6	4347.98	A threaded bolt in the base of a telegraph pole. Located from the post office in Sumpter 0.35 mile south along Highway 220 to an intersection with Sawmill Gulch Road. Continue 0.35 mile southwest on Sawmill Gulch Road to an intersection with a dirt road on the left, and 0.35 mile southeast on the right side of a "Y" intersection.

EXHIBIT 3 - ELEVATION REFERENCE MARKS (cont'd)
BAKER COUNTY, OREGON, AND INCORPORATED AREAS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 7	4360.23	CH2M HILL set a chiseled square in the top northeast corner on a concrete bridge abutment. Located 0.35 mile from the post office in Sumpter to an intersection with Sawmill Gulch Road, and 0.2 mile southwest on Sawmill Gulch Road on the bridge over Powder River.
RM 8	2626.48	CH2M HILL set a chiseled square in the curb on the northwest corner of the bridge over Pine Creek. Located 0.45 mile east from Halfway post office on Pine Creek Highway, 14 feet left of highway centerline and 1.0 foot above pavement.
RM 9	2642.98	An Oregon State Highway Department brass disk, set in the curb on the northwest corner of the bridge over Pine Creek. Located 0.25 mile east from Halfway post office on Pine Creek Highway, 0.2 mile north on Slaugherhouse Road, 13.5 feet left of road centerline and 0.4 feet above pavement.
RM 10	2720.95	An Oregon State Highway Department brass disk, set in the curb on the northwest corner of the bridge over Pine Creek. Located 0.45 mile northwest from Halfway post office on Halfway-Cornucopia Highway to "Y" intersection, 0.65 mile along East Pine Creek Road, 15 feet left of road centerline and 0.8 feet above pavement.
RM 11	3475.96	CH2M HILL set a chiseled square in the southwest corner on a "V" concrete irrigation structure. Located 1.6 miles south from the intersection of Broadway and Main Street at Baker, approximately 450 feet east of State Highway No. 7 (Baker-Unity Highway) on the Powder River.
RM 12	3489.67	CH2M HILL set a chiseled square in the northeast end on a concrete wingwall of a box culvert with two 6 feet x 6 feet openings. Located 2.3 miles south from the intersection of Broadway and Main Street at Baker, on the east side of the State Highway No. 7 (Baker-Unity Highway).

EXHIBIT 3 - ELEVATION REFERENCE MARKS (cont'd)
BAKER COUNTY, OREGON, AND INCORPORATED AREAS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 13	3491.09	A U.S. Coastal and Geodetic Survey brass disk stamped "H 387 1944." Located approximately 2.6 miles from the intersection of Broadway and Main Street at Baker on State Highway No. 7 (Baker-Unity Highway), at highway scales, 40 feet east of centerline of highway, 15 feet southwest of southwest corner of scale house, top of scale wall.
RM 14	3396.68	A U.S. Coastal and Geodetic Survey disk stamped "K305 1934," set in a concrete base of the Oregon Trail Monument. Located 2.6 miles northwest from the intersection of Broadway and Main Streets at Baker, along U.S. Highway 30, approximately 200 feet north of the intersection with Imnaha Road.
RM 15	3415.68	CH2M HILL set a chiseled square on the northwest corner of the bridge over Powder River. Located from the post office in Baker, 0.6 mile north of Main Street, 0.35 mile east on Campbell Street, 0.95 mile north on Cedar Street, and 0.5 mile west on Huges Lane.
RM 16	3404.46	CH2M HILL set a chiseled square in the southwest concrete abutment of the bridge over the Powder River. Located from the post office in Baker, 0.6 mile north on Main Street, 0.35 mile east on Campbell Street, 0.95 mile north on Cedar Street, 0.5 mile west on Hughes Lane to bridge, and 0.6 mile north along west bank of Powder River.
RM 17	3398.08	An Oregon State Highway Department brass disk stamped "X 659 1974," set in the west side of a concrete median drain. Located 0.1 mile north of Route 86 overpass on Interstate 84.
RM 18	3401.97	An Oregon State Highway Department brass disk stamped "G447 1952." Located 2.91 miles northwest of the post office in Baker, along Federal Aid Highway 506 (Pocahontas Road), 35 feet south of highway centerline.

EXHIBIT 3 - ELEVATION REFERENCE MARKS (cont'd)
BAKER COUNTY, OREGON, AND INCORPORATED AREAS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 19	3419.48	Steel post one foot northwest of rebar in monument case and cover at the northeast corner of Section 17, T. 9S, R 40E. Established by the COE.
RM 20	3431.23	Brass screw and washer set in intersection of Main and Campbell Streets. Established by the COE.
RM 21	3445.12	Monument case and cover set in concrete monument at intersection of Elm Street and Spring Garden Avenue. Established by the COE.
RM 22	3463.34	Brass screw and washer set in 1.5-inch iron pipe, approximately 56 feet south of signal box No. 3383 and 18.4 feet west of west rail of Union Pacific Railroad. Established by the COE.
RM 23	3471.65	Brass screw and washer set in intersection of Foothill Drive and a gravel road to the east which intersects State Highway 7. Established by the COE.
RM 24	3510.73	Brass screw and washer set in approximate centerline of State Highway 7. Established by the COE.
RM 25	3410.16	Railroad spike at intersection of 17th Street and Pocahontas Road. Established by the COE.
RM 26	3418.27	Brass screw and washer set at approximate intersection of H and 17th Streets. Established by the COE.
RM 27	3422.89	Monument case and cover at intersection of 17th and Campbell Streets. Established by the COE.
RM 28	3441.51	5/8-inch rebar in monument case and cover at intersection of Auburn Avenue and 9th Street to the south; it is the second monument west of railroad crossing on Auburn Street. Established by the COE.

EXHIBIT 3 - ELEVATION REFERENCE MARKS (cont'd)
BAKER COUNTY, OREGON, AND INCORPORATED AREAS

Reference Mark	Elevation (feet NGVD)	Description of Location
* RM 29	3278.209	Union Pacific Railroad disk on top of the curb on the northwest corner of the Union Pacific Railroad overpass on Thief Valley Road.
* RM 30	3241.690	The northwest corner of the 26-inch square railroad signal light base located 1,800 feet east of the Union Pacific Railroad overpass on Thief Valley Road, 4 feet south of the mainline track (Stevens, Thompson, and Runyan, Inc.).
* RM 31	3240.450	Center of A Street and Union Pacific Railroad crossing on top of planking which is level with the top of rail (Stevens, Thompson, and Runyan, Inc.).
* RM 32	3266.860	Top of southeastern corner of concrete box culvert No. 32268 under railroad track. Culvert is approximately 600 feet west of the U.S. Highway 30 viaduct. Established by Stevens, Thompson, and Runyan, Inc.

* Located in the City of North Powder, Union County; Area Not Included.